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The role of caregivers in the development of emotion regulation (ER) in infancy and early childhood has been established; however, friendships may serve an important role in socializing the ongoing development of regulatory processes starting in late childhood. A developmental model of the influence of friends on individual differences in ER through selection and socialization effects was examined in a longitudinal sample. Physiological and behavioral indicators of ER were examined when children were 5, 7, and 10 years old, and mothers reported on children's social competence and aggression at age 7. Sociometric nominations of children's mutual friends in 2nd grade were used to measure the characteristics of participant's friends. Results indicated that physiological and behavioral indicators of ER were stable from 5 to 10 years. The behavioral indicator of ER, but not the physiological indicator of ER, at age 5 was associated with high levels of social competence and low levels of aggression at age 7. The results of the behavioral model indicated that increased social competence at age 7 was associated with friendships with peers in second grade who engaged in positive behaviors, which in turn predicted increases in ER. Tests of gender invariance revealed that the associations in the behavioral model differed for boys and girls. Overall, these results demonstrate the sequence of effects that influence the continued development of ER, over and above the stability of regulation over time. This study also highlights the importance of peers in the socialization of emotion regulation starting in late childhood.

THE SOCIALIZATION OF EMOTION REGULATION IN LATE CHILHDOOD:

THE INFLUENCE OF FRIENDSHIP

by

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Approved by

_____
Committee Chair

To my family for their support through the many many years and to Jason- we can finally start the next phase of our lives together and I cannot wait.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I

INTRODUCTION

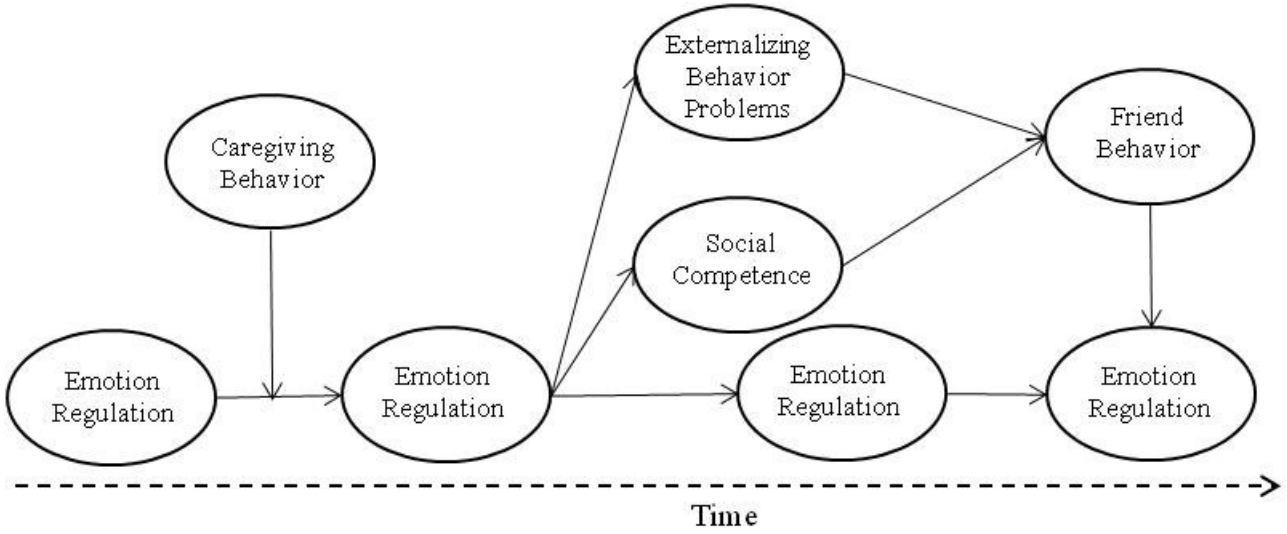
Emotion regulation plays an important role in either enhancing or impairing social outcomes. Poor emotion regulation is implicated in the development of behavior problems (e.g., Cole, Michel, & Teti, 1994; Mullin & Hinshaw, 2007), and in adaptive outcomes such as social competency (e.g., Denham et al., 2003). The development of emotion regulation is crucial in the formation of healthy social networks and it is therefore important to identify the factors that influence the development of adaptive or maladaptive regulatory abilities.

Much is known with regard to early influences on regulatory processes, including the influence of caregivers, although less is known about the role that siblings and peers may play (Thompson & Meyer, 2007). Such an examination is necessary because children's developmental needs and the environments they interact in change with maturation. Early in development caregivers serve as the main agent of socialization, however, peers may be an important influence on the development of emotion regulation in childhood. More specifically, friendship is a dimension of peer relationships that provides opportunities for socioemotional development including the ongoing development of emotion regulation. Friends serve as models for behavior and provide the opportunity to not only observe ongoing and consistent messages of appropriate behavior, but also the opportunity to learn the short- and long-term consequences of their

friend's actions (Bandura, 1977). As children enter formal schooling and face new social challenges, their regulatory abilities may be shaped by new agents of socialization-friends.

In assessing the continued socialization of emotion regulation across childhood, explanations must consider the interplay of behavioral and physiological components; however, little research has emerged to address how these systems continue to mature during this stage in development. In describing the continued socialization of emotion regulation past early childhood, a model of changing influences from caregivers to friends is proposed (see Figure 1). Specific developmental pathways examining the relation between emotion regulation, behavioral adjustment, and peers will be more thoroughly examined, as past research has demonstrated the dynamic, cascading influences of these constructs during childhood (Blandon, Calkins, Grimm, Keane, & O'Brien, 2010). This analysis leads to several specific and testable hypotheses, which are examined through a full structural model. The influence of gender on the proposed model is also examined.

Figure 1. Proposed Model of the Socialization of Emotion Regulation From Early to Late Childhood.



CHAPTER II

LITERATURE REVIEW

Early Emotion Regulation

Emotion regulation is defined as both the intrinsic and extrinsic strategies that are utilized by an individual to enhance or inhibit the experience and expression of emotions (Calkins & Hill, 2007; Thompson, 1994). These strategies can be conscious or unconscious and work to monitor, evaluate, and change emotional reactions (Calkins & Hill, 2007; Thompson, 1994). Given this definition, dysregulation would suggest impairment in an individual's regulatory process with a pattern of responding that impairs adaptive functioning (Cicchetti, Ganiban, & Barnett, 1991). The process of regulating emotions is also thought to have two related but distinct components, control and reactivity (Calkins, Gill, Johnson, & Smith, 1999; Cole, Martin, & Dennis, 2004). These control and arousal components are dynamic and impact one another over time (Calkins & Hill, 2007). Definitions of emotion regulation suggest that an individual's ability to regulate emotional arousal has implications for the ability to successfully interact interpersonally through mutual and appropriate interactions (e.g., Calkins, 1994).

Emotion regulation develops through both intrinsic and extrinsic influences (Calkins, 1994; Calkins & Hill, 2007). Specifically, Calkins (1994) conceptualized these two modes of influence as contributing to individual variation in the development of

emotion regulation. The proposed model assesses the intrinsic factors in toddlerhood and early childhood that lead to individual differences in emotion regulation. Internal sources of individual differences in emotion regulation include neuroregulatory systems and behavioral traits (Calkins, 1994). One neuroregulatory system that has been of significant focus is autonomic nervous system (ANS) reactivity. Based on the polyvagal theory (Porges, Doussard-Roosevelt & Maita, 1994; Porges, 1996), neural regulation of the ANS regulates homeostatic functioning which is implicated in the regulation of motion, communication, and emotion. The vagus, a cranial nerve that projects to organs including the heart and digestive system, regulates homeostasis via digestion, respiration, and emotion (Porges et al., 1994). Measures of respiratory sinus arrhythmia (RSA) are a means to evaluate cardiac vagal tone through assessing the stable increase and decrease in heart rate that change as a function of the influence of the vagus nerve (Porges, 1995; Porges et al., 1994). In the presence of an environmental demand, the ANS increases metabolic output via withdrawal of the vagal brake leading to an increase in heart rate and an excitation of the sympathetic nervous system promoting the fight or flight response (Porges et al., 1994). The vagus system modulates the ability to physically approach or withdraw in response to the environment and can allow for more resources to become available to deal with a stressor (Porges, 1996).

Although physiology is the biological basis for early regulation, children's behaviors contribute to individual differences in emotion regulation. According to Calkins (1994), the link between biological and behavioral aspects of regulation is strong and bidirectional. Biological reactivity, when it manifests in behavioral displays,

influences a child's ability to employ adaptive regulatory strategies. The behavioral strategies employed by the child may serve to help them manage a challenge from the environment or to intensify their emotional experience, depending on their effectiveness. These behavioral aspects of early regulation include strategies such as looking towards caregivers, self-soothing, distraction, and avoidance which have been identified as more or less effective in reducing arousal given the degree of distress the child is experiencing and the specific challenge they are responding to (Buss & Goldsmith, 1998; Diener & Mangelsdorf, 1999).

Calkins's (1994) conceptualization of the development of emotion regulation leads to several important implications. One is that physiology and behavioral regulation are highly related and bidirectional. Second, this interrelatedness suggests that influencing one domain of regulation may have consequences for the other domain. Therefore, those extrinsic sources of influence on individual differences in emotion regulation are important to understand, as they may continue to alter regulatory processes across childhood.

Caregiving Behavior

External sources of influence contribute to individual differences in regulation which implies that regulatory abilities can be shaped and modified. Kopp (1982) has argued that self regulation emerges through interactions with others in the environment. Caregivers have been identified as a powerful extrinsic influence on the development of regulation based on the early attachment relationship (Calkins, 1994; Calkins & Hill, 2007). Caregivers initially serve as active managers of children's early emotional

displays through actions such as moving the child away from distressing stimuli or engaging in soothing behaviors (Zeman, Cassano, Perry-Parrish, Stegall, 2006). As children become better able to exert control over their environments, their capacity to regulate their emotional experiences also increases through interactions with caregivers and explicit training (Calkins, 1994). Morris, Silk, Steinberg, Myers, and Robinson (2007) have suggested that caregivers influence the development of emotion regulation during childhood in three ways: through children's direct observation and subsequent modeling of parent's emotional displays and strategies, through parenting practices and socialization directly related to emotion regulation, and through the emotional climate of the family including parenting style. Therefore, caregivers serve to socialize children's understanding, expression, and management of emotions.

Caregiver's parenting styles and specific types of caregiver behaviors have been associated with the development of emotion regulation. Caregiver sensitivity to the infant or child's individual needs serves to facilitate the continued development of emotion regulation and self control (Kopp, 1982). In particular, caregiving behaviors such as warmth and responsiveness are related to emotion regulation in childhood (McDowell, Kim, O'Neil, & Parke, 2002). The nature of mother's engagement with their children has been shown to be related to whether children develop adaptive or maladaptive regulatory strategies. Mother's positive guidance while interacting with their child has been found to be positively related to children's use of constructive regulatory strategies (Calkins & Johnson, 1998). In contrast, controlling, negative maternal behavior has been associated with lower vagal suppression and use of less

adaptive regulatory strategies, such as orienting to the distressing stimulus (Calkins & Johnson, 1998; Calkins, Smith, Gill, & Johnson, 1998). The link between caregiving behavior and physiological regulation has been demonstrated in subsequent research, where mother's use of negative, controlling behaviors was associated with lower vagal suppression during a social challenge task (Hastings et al., 2008). Caregivers are proposed to moderate the influence of early emotion regulation on later regulatory processes. Therefore, the caregiver's style of interacting with their children fosters an environment for the continued development of regulatory competencies, both in terms of behavioral strategies and physiological regulation.

As children develop these competencies, they become capable of actively managing their own emotional reactions within new social contexts. Through the influence of caregivers children develop specific regulatory behaviors which become part of the child's repertoire of skills (Calkins, 1994). Children become equipped to regulate without the direct aid of their caregiver, and this repertoire of regulatory competencies that has developed has an impact on children's behavioral adjustment, which in turn affects their success in social domains.

Emotion Regulation in Late Childhood

Although emotion regulation is considered somewhat stable from early childhood on (e.g. Raffaelli, Crocket, & Shen, 2005), elements of emotion regulation continue to be refined into late childhood and early adolescence and are subject to the influence of the environment. In an assessment of the trajectories of emotion regulation and negativity from ages 4 to 7, emotion regulation increased over time (Blandon, Calkins, Keane, &

O'Brien, 2010). There was significant variability in these trajectories; however, indicating that changes in emotion regulation are related to both individual child factors and also external, environmental factors (Blandon et al., 2010). Further, the neuroregulatory and behavioral systems associated with emotion regulation continue to mature through adolescence. Brain growth, interconnections in nerve cells, and pruning of connections occur during adolescence, as does the development of the frontal lobe which is implicated in several domains of functioning including executive functioning, goal directed behaviors, and emotion regulation (Giedd, 2008; Spear, 2000). Therefore, although emotion regulation is somewhat stable across childhood, these processes are also susceptible to environmental influences. Individual differences in emotion regulation are expected to emerge in late childhood as a result of these influences. In contrast to the literature on biological and maturational changes into adolescence, there is little research assessing how physiological and behavioral indices of emotion regulation specifically change during late childhood. Increased RSA in childhood is associated with effective emotion regulation in adolescence (Vasilev, Crowell, Beauchaine, Mead, & Gatzke-Kopp, 2009) and it is generally accepted that early physiological regulation is associated with later adjustment.

There is some research on the behavioral nature of emotion regulation into later childhood and adolescence (e.g. Morris, Silk, Steinberg, Myers, & Robinson, 2007, Raffaelli et al., 2005, Shipman, Zeman, & Stegall, 2001). Regulatory strategies are believed to continue to be refined with maturation. With age, children are able to distinguish between both long- and short-term strategies to regulate as they are better able

to identify long-term consequences and outcomes of their behavior (Moilanen, 2007). Similarly, they can identify more goals, specifically social goals, for regulating their behaviors. For example, older children expect that displays of negative emotionality are damaging to peer relationships, particularly when the goal is to take care of another's feelings (Shipman et al., 2001; Zeman & Shipman, 1998). Thus, children engage in more sophisticated regulation strategies to "mask" these negative emotions in front of peers including verbal and facial strategies (Shipman et al., 2001; Zeman & Shipman, 1998).

Though early emotion regulation has been found to be stable over time, individual differences in emotion regulation continue to develop past early childhood so it is important to assess the factors that influence individual differences in regulation in late childhood. As children's social interactions become increasingly more complex, new and unique demands are placed on regulatory processes. Relationships have been described as the "inputs and outputs of emotion regulation," and therefore emotion regulation is pivotal to initiate and sustain successful, socially competent relationships but also is influenced by these relationships (Bell & Calkins, 2000). Through a child's behavioral adjustment and the development of social competence, individual differences in emotion regulation impact children's success in social domains.

Outcomes of Emotion Regulation: Behavioral Adjustment and Social Competence

Examination of influences on the development of emotion regulation is important because such regulation has an impact on later development and adjustment. Emotion regulation is crucial for adaptive development as it has repeatedly been tied to social outcomes (e.g., Denham et al., 2003; Keane & Calkins, 2004; Murphy, Shepard,

Eisenberg, & Fabes, 2004). Effective emotion regulation in childhood is implicated in social competence including the formation and maintenance of social relationships (Sokol & Muller, 2007; Zeman, Cassano, Perry-Parrish, Stegall, 2006). A child's regulatory style is related to their interactions with peers, as effective regulation allows the child to control extreme emotional states and subsequently have reciprocal and successful social interactions (Calkins, 1994). Infants who showed effective regulation of heart rate during a cognitive task were also observed to be more engaged with experimenters, to engage in more social approach during tasks, and to exhibit more positive emotions (Stifter & Corey, 2001). Physiologically, those children who consistently exhibit greater RSA suppression have better social skills, less negative reactivity, and experience fewer externalizing behavior problems (Calkins & Keane, 2004). The impact of regulation on social outcomes occurs through appropriate arousal, planning, and processing of social information (Eisenberg, Hofer, & Vaughan, 2007). Regulation is paramount as it is tied not only to effectively managing a child's own emotional experiences, but also to how they respond to social challenges.

Emotion regulation is also related to the development of behavior problems and aggression. Dysregulation is often conceptualized as lying on a continuum; at one end are individuals whose responses are intense and difficult to recover from and exhibit a pattern of over-regulation, and at the other are individuals whose responses are weak and constricted and exhibit a pattern of under-regulation (Cole et al., 1994; Kennan, 2000). Early behavior problems can be thought of as falling one end of this continuum, with externalizing behavior problems such as aggression and conduct problems representing

an under-regulation of emotions (Cole et al., 1994; Mullin & Hinshaw, 2007). Under-regulation of emotions is consistently associated with externalizing problems (Eisenberg at al., 2001; Hill, Degnan, Calkins, & Keane, 2006; Zeman, Shipman, & Suveg, 2002). Children with high levels of emotion regulation exhibit decreases in externalizing symptoms, indicating that the development of adaptive emotion regulation is crucial in modulating emotional reactions and behaviors (Blandon et al., 2010). Physiological correlates of emotion regulation also map onto these outcomes. For example, children who are high-risk for externalizing problems exhibit more negative affect, less effective regulation strategies, and consistently lower physiological regulation in terms of RSA suppression during challenging tasks (Calkins & Dedmon, 2000). Early emotion regulation, therefore, is proposed to be associated with the development of behavior problems in childhood and with children's ability to appropriately process social information and display socially appropriate responses to their environment

Gender Differences

Though the development of individual differences in emotion regulation has been well documented, investigation of gender differences has led to inconsistent findings. Gender differences have been explored with regard to emotion regulation, behavior problems, and social competence. Emotional expression and regulatory abilities may differ for boys and girls, particularly due to differences in emotion socialization, as boys typically learn to suppress their emotional displays (Perry-Parrish & Zeman, 2011). Perry-Parrish and Zeman (2011) found that boys were more likely to inhibit their expression of sadness, which in turn was related to their peer acceptance. Further, girls

have been found to have marginally higher levels of regulation, and boys were found to have marginally higher levels of negativity at age 7 (Blandon, Calkins, Keane, & O'Brien, 2008).

With regard to behavior problems and social competence, the research is more mixed. Boys are generally found to have higher levels of externalizing behavior problems although these differences have not been found consistently and may be a function of the rater (Miner & Clarke-Stewart, 2008; Webster-Stratton, 1996). In our own research, we have found that membership in profiles of externalizing behavior problems in early childhood and the overall continuity and stability of behavior problems for boys and girls are similar (Hill et al., 2006; Smith, Calkins, Keane, Anastopoulos, & Shelton, 2004). In reviewing the research on gender differences in behavior problems, Keenan and Shaw (1997) found that, prior to age 4, boys and girls show similar levels of externalizing and internalizing behavior problems. Past the age of 4, girls evidence a decline in externalizing behavior problems and boys demonstrate stability or an increase in behavior problems. In terms of social competence, although Green, Cillessen, Rechis, Patterson, and Hughes (2008) found gender differences in strategies of social problem solving, they generally found more similarities than differences. Other research has also not found gender differences in social competence with peers, both when assessing laboratory behavior and teacher reported behavior (Hastings, McShane, Parker, & Ladha, 2007). Overall, the research on differences in the level of behavior problems and social competence as a function of gender is mixed. For example, in terms of affective social competence (the ability to send and receive emotional cues and manage emotional

experiences), gender differences were not found between boys and girls generally; however, girls who had increased social competence were more likely to be accepted by peers, and the opposite was true for boys (Dunsmore, Noguchi, Garner, Casey, & Bhullar, 2008). Therefore, it may be more beneficial to consider how it is that these differences may emerge, and whether the development of emotion regulation and behavioral adjustment occurs differently for boys and girls.

A compelling body of research focuses on the *process* of how these differences emerge. Keenan and Shaw (1997) hypothesized two process-oriented explanations for gender differences in behavior problems. One is that girls' decreased level of externalizing behavior problems is due to the socialization of girls towards internalizing behavior problems. The second is that girls develop skills that facilitate their social interactions which help shape them away from problem behaviors and toward more adaptive behaviors. This second explanation fits well with the research on gender differences in social competence. Differential socialization of positive behaviors for boys and girls is expected to result in differences in social competence (e.g. Hastings et al., 2007). Therefore, socialization and skill development may contribute to whether girls develop behavioral difficulties, and deficits in these skills may be more detrimental than for boys.

Different factors have also been found to contribute to the development of behavior problems for boys and girls. Webster-Stratton (1996) found that family and parenting variables predicted girls' externalizing behaviors, though only boys' previous behavior problems predicted later externalizing behavior. In a recent review of the

literature examining the association between emotion regulation and aggression, gender was found to be a moderator in several longitudinal studies; the association between regulation and aggression was stronger for girls (Roll, Koglin, & Petermann, 2012). Other research has been more mixed. In the study previously discussed examining profiles of externalizing behavior problems, socioeconomic status was a predictor of behavior problems for boys, but for girls emotion regulation distinguished membership in chronic profiles (Hill et al., 2006). In contrast, we have found that physiological regulation was related to teacher-rated behavior problems for boys but not for girls (Graziano, Keane, & Calkins, 2007).

Overall, the research suggests that there may be greater consequences for girls who do not develop gender-appropriate displays of emotion. Although there may not be remarkable differences for boys and girls in their levels of social competence, the socialization of emotions for boys and girls may differentially predict their social behavior and what is acceptable to their peer group. Based theories on differential socialization of emotions in boys and girls and the reviewed research, it is possible that emotion regulation is more strongly tied to the development of aggression and social competence for girls and girls who have poor emotion regulation may be at greater risk for adjustment problems. Analysis of risk for behavioral difficulties is crucial, as children's adjustment may dictate the peers available to enter into friendships with.

The Influence of Friends on Emotion Regulation

Although it is clear that caregivers are an important part of children's social networks, these networks widen and change in nature as peers take up increasing periods

of time. Further, peer interactions demand different socially relevant behaviors and therefore offer a unique socialization experience. As these new social contexts place different demands on children's regulatory abilities, these abilities in turn continue to be refined. Prior conceptualizations have linked the development of emotion regulation to peer outcomes in childhood (e.g., Calkins, 1994), although these models have not focused on how peers, and specifically friends, may continue to enhance or impede the development of successful regulatory processes.

Friendships consist of individuals who prefer the company of one another, adjust their behaviors for each other, display positive feelings toward each other, and display distress when separated (Ladd, 2005). Having a friend is considered normative in childhood and adolescence (Hartup, 1996) and approximately 90% of adolescents can name a close friend with most of these named peers reciprocating this nomination (Brown, 2009). The construct of friendship falls on a continuum which ranges from acquaintance to best friend and varies based on knowledge and liking for the other peer (Berndt & McCandless, 2009; Hartup, 1996). When two individuals identify one another as a best friend, they are thought to have a mutual or reciprocal friendship (Newcomb & Bagwell, 1995). Across definitions of friendship, traits of mutual knowing and liking are common (Berndt & McCandless, 2009; Bukowski, Motzoi, & Meyer, 2009; Ladd, 2005; Newcomb & Bagwell, 1995).

The unique nature of the friendship relationship allows for opportunities to model and refine social competencies. Friends experience high levels of social contact, mutual liking and closeness, and more opportunities for cooperation and conflict resolution

across ages (Newcomb & Bagwell, 1995). Newcomb and Bagwell (1995) have suggested that these factors foster more opportunities to learn and master social skills, thereby making friendships a context for developmental growth. Through these opportunities, children gain the social competencies to aid them in the development of subsequent friendships (Bukowski, Valasquez, & Brendgen, 2008). As such, friendships provide a developmental resource across the lifespan (Hartup & Stevens, 1997). Given that biological changes affecting emotional processes occur during late childhood and adolescence, friends may fulfill the developmental need of refining and practicing emotional competencies including regulatory processes.

The Influence of Children's Behavioral Adjustment on Friendship Identity

The nature of the regulatory skills that are gained through friendships will depend on the identity of the peers that children befriend, which is first determined by the child's own behavioral adjustment. Emotion regulation facilitates children's ability to initiate and sustain successful, socially competent relationships (Bell & Calkins, 2000). Flexible regulation allows children to inhibit or activate behavior accordingly. This allows for socially appropriate behaviors through context-appropriate arousal, planning, and accurate processing of social information in the environment (Eisbenberg et al., 2007). Effective or ineffective regulation contributes to success in social domains through a child's social competence which in turn impacts the peer group's perception of the child. It is proposed that externalizing behavior problems and social competence are related to the identity of the peers that children befriend. Children who are well-regulated in preschool and less likely to vent emotions are identified as socially competent (Denham

et al., 2003). Moreover, low levels of negativity, peer report of emotional lability, and teacher report of increased regulation strategies are related to concurrent and future social competence as rated by peers (Maszk, Eisenberg, & Guthrie, 1999). Children who are viewed by their teachers as socially competent are also viewed as low in negative emotionality and high in regulation, and both parents and teachers perceive children high in negativity and low in regulation to have low social competence in school and to exhibit greater problem behaviors (Murphy et al., 2004). In addition, children's social skills in kindergarten predict their peer-rated social acceptance, such that high levels of social skills are related to increased popularity (Blandon et al., 2010). The ability of a child to regulate emotions in social situations therefore impacts how the peer group perceives that child and the likelihood that they will enjoy subsequent peer interactions.

Though effective emotion regulation results in the development of social competencies, poor emotion regulation may lead to poor social outcomes through behavioral maladjustment. The inability to effectively regulate one's emotions may result in intense emotional displays, aggression, or conflict in social settings which translates to unsuccessful interactions with peers. For example, two year olds who exhibited increased distress and engaged in venting regulation or oriented to a distressing object during frustration tasks also engaged in conflict during peer play tasks (Calkins et al., 1999). Similarly, children's anger reactions that are less constructive, such as venting and physical retaliation, are related to greater emotional intensity but children who employ more constructive methods are rated as having better social skills and social status as well as lower aggression and emotional intensity (Eisenberg, Fabes, Nyman,

Bernzweig, & Pinuelas, 1994). Moreover, maladaptive behaviors are related to lower social status and peer reported social behaviors such as engaging in fighting and bossiness in boys, and sociometric nominations of aggressiveness and sneakiness for girls (Keane & Calkins, 2004). Therefore, a child's regulatory abilities affect their behavioral adjustment which impacts peer perceptions and reactions. These peer perceptions then have an effect on whether peers are willing to enter into a friendship with the child, making early emotion regulation abilities a determinant of the peers available to for a potential friendship. Those children who lack the regulatory abilities that are necessary for successful social interaction have fewer mutual friendships (Dishion, Piehler, & Myers, 2008). It is proposed that children who are well-regulated develop the social skills necessary to form these successful peer relationships. In contrast, those children who are highly reactive and dysregulated are viewed by peers and adults as socially unskilled and aggressive and, as a result, have a restricted group of peers to form friendships with.

Children tend to befriend peers that are similar to them in terms of adaptive or maladaptive behaviors. This occurs through assortative pairing in which children who are similar on mutually important traits enter into a relationship (Kandel, 1978). Individuals tend to befriend like-minded people and this homophily contributes to ongoing similarity in friendships (Steinberg & Monahan, 2007). Given that emotion regulation impacts teachers' and peers' perceptions of social competencies and displays of aggression, those peers that are well regulated and socially competent may be unwilling to befriend another child who is aggressive or impulsive. As a result, children

who engage in disruptive behaviors may be more likely to befriend other children with behavior problems, and children who are socially competent are likely to form friendships with other socially competent children. In their past work, Fabes and colleagues (Fabes et al., 2012) found that children with low levels of prosociality rarely played with highly prosocial children; children with deficits tended to play with one another and prosocial children tended to play with other prosocial children. Assortative pairing thereby influences which peers are available for the further socialization of emotion regulation. As children take on the norms of their peer group they are also socialized toward certain behaviors and beliefs that will continue to shape their emotion regulation development. Although friendship is often thought of as positive and developmentally advantageous, whether friends influence children towards adaptive behaviors and competencies versus maladaptive behaviors is bound in factors that are of interest in this analysis. The identity and characteristics of a friend may have a far greater impact on adjustment than just having a friend alone (Hartup, 1996; Hartup & Stevens, 1997). Through assortative pairing and the socialization of certain strategies and competencies by similar peers, emotion regulation skills continue to be refined and are reflective of the children involved in the friendship.

The Impact of Friend Behaviors on Emotion Regulation

The development of individual differences in emotion regulation occurs through socialization, the process of behavior being affected by peer affiliations (Prinstein & Dodge, 2008). Social learning theory, with an emphasis on external influences including reinforcement, aligns with models of the development of emotion regulation (e.g.,

Calkins, 1994) that emphasize external sources of influence on the development of regulatory processes and also is consistent with the literature describing peer influence. Social learning theory is a predominant theory of socialization in the peer literature (e.g., Hartup, 2009; Hay, Caplan, & Nash, 2009; Ladd & Mize, 1983). Bandura's social learning theory (1977) posits that behavioral and psychological functioning is determined by continuous reciprocal interactions between people and the environment. Almost all learning occurs through these interactions as individuals observe others' behaviors and note the consequences for those actions (Bandura, 1977). This learning is consolidated and used to determine one's future behaviors which is more efficient than having to engage in trial and error oneself to learn the outcomes for behaviors (Bandura, 1977). How modeling impacts the observer depends on several factors including characteristics of the observer, the environment an individual is being influenced within, characteristics of the influencer, their relationship to one another, and peer norms (Hartup, 2009). The norms of the peer group and the identity of children's friends dictate what behaviors and competencies are reinforced and repetition of behaviors leads to consolidation of these behaviors. Thus, through social interactions something external, such as the norms of the peer group, becomes internalized (Hartup, 1996; Steinberg & Avenevoli, 2000).

Social learning theory provides a framework for understanding the development of emotion regulation through friends, as regulatory processes similarly develop through interactions with external agents. Social learning theory uniquely speaks to the power of friends as models for socialization. Children are likely to experience several conflicting peer models and messages and those behaviors that are the most consistent are most

likely to be learned (Bandura, 1977; Brown, 2009). This is particularly compelling given that, when parents provide a conflicting message, peer models may be favored over adult models (Bandura, 1977). Reinforcement from these models does not need to be extrinsic in nature and the modeled behavior will be enacted in the future if the individual notes that the behavior results in positive, valued outcomes more so than if they note the outcomes to be punishing or neutral (Bandura, 1977). Friendships provide extrinsic reinforcement through verbal praise, time spent in activities, and camaraderie and they also provide intrinsic reinforcement through feelings of acceptance and belonging. Therefore, both the value of the friendship itself and the overt reinforcement received by friends are likely to sustain desirable behaviors and extinguish undesirable behaviors.

Whether a friendship is developmentally advantageous is largely determined by the identity of the friend who serves as a model for specific behaviors and emotional displays. The behaviors and values a peer group socializes depends on the norms of that given group, whether prosocial or antisocial (Brown, Mounts, Lamborn, & Steinberg, 1993). Bukowski and colleagues (2008) found that 11 to 13 year olds viewed themselves as more similar to their friends than to nonfriends, particularly in terms of norms for behavior. Those children who were more tolerant of aggression felt that their peers similarly were tolerant of aggression and children who placed an importance on more adaptive behaviors like academics perceived their friends to share this value (Bukowski et al., 2008). This provides evidence that the identity of friends, and children's perception of this identity, guides behavior. Socially skilled peers serve as a protective factor across development and those friends who are unskilled and antisocial serve as risk

factors (Hartup, 1996; Hartup & Stevens, 1997). Therefore, the identity of the friend dictates whether adaptive or maladaptive regulatory strategies are modeled and subsequently socialized.

It is predicted that, when the identity and qualities of a friend are positive, more adaptive regulatory behaviors are socialized. Howes (2009) asserts that friendships influence the development of emotion regulation and conflict resolution strategies. Peer groups influence the behaviors of others and, through their interactions, facilitate the development of social competencies (Kindermann & Gest, 2009). In a study of pre-kindergarten and kindergarten aged children, affiliation with prosocial peers was associated with increases in positive emotionality and decreases in negative emotionality for both boys and girls, over and above their initial emotionality (Fabes et al., 2012). Time spent in friendships provides opportunities for children to practice interpersonal skills that would not be provided by other kinds of relationships (Laursen, Finkelstein, & Betts, 2000). Maintenance of friendships offers opportunities to develop conflict resolution skills and note the outcomes of these strategies (Fonzi, Schneider, Tani, & Tomada, 1997). As a consequence of these sustained friendships, more sophisticated and sensitive conflict resolutions such as negotiation and compromise emerge (Laursen et al., 2000). Research indicates that children placed in friend dyads (versus non friend dyads) spend more time negotiating and compromising and this sensitivity to the needs and desires of their friend predicts continuation of the relationship (Fonzi et al., 1997). Friendships offer an environment to hone adaptive skills as they tend to be egalitarian and friends spend more time together over longer periods of time, thus providing children

evidence for the continued reward of adaptive social skills (Laursen, Finkelstein, & Betts, 2000).

Although friendships may serve as a developmental resource, when a child's friend engages in maladaptive behaviors then the impact of the friendship may impede the development of emotion regulation. An explanation for why poorly regulated children continue to be socialized towards maladaptive regulatory strategies and behaviors is the "arrested socialization hypothesis." Dishion et al. (2008) suggest that engagement in continuous deviant behaviors limits the development of social and emotional competencies including emotion regulation. In turn, these children are more susceptible to peer influence as they lack the planning and impulse control necessary to decline participation in the negative behaviors endorsed by their friends (Dishion et al., 2008). By engaging in these maladaptive behaviors with similarly deviant peers, children are unlikely to develop the competencies necessary to enhance their emotion regulation and resist negative influences.

The socialization of maladaptive strategies and negative behaviors through friends has consistently been established. In describing the phenomenon of deviancy training, Dishion and colleagues (Dishion, Spraklen, Andrews, & Patterson, 1996; Dishion, Eddy, Hass, & Li, 1997; Dishion, McCord, & Poulin, 1999) found that positive reinforcement towards conversations about deviant topics such as rule breaking occurred in friendship dyads of deviant peers, but that non-deviant peers ignored these topics and reinforced normative topics. This points to the importance of the identity of friends as their own values dictate whether deviant talk, and subsequent deviant behavior, is condoned and

reinforced. In a summary of their studies, Dishion et al. (1999) note that deviancy training between ages 13 to 14 resulted in increases in delinquent behaviors, including addictive and violent behaviors at later ages. Individual differences in self-regulation may serve as a protective factor from deviant peer influence, as a well-regulated adolescent is less susceptible to the immediate rewards posed by engaging in deviant talk or behavior among their peers (Gardner, Dishion, & Connell, 2008). This may be supported by the finding that deviant youth experience greater susceptibility to peer influence (Brown, Clasen, & Eicher, 1986; Steinberg & Monahan, 2007). Similarly, self-control has been found to moderate the link between deviant peers and delinquent behavior given that a lack of self-control leads to maladaptive behaviors (McGloin & Shermer, 2009). Therefore, emotion regulation is necessary for youth to avoid succumbing to negative peer influence and poor regulation is linked to vulnerability to peer influence (Dishion et al., 2008). Based on these findings, it is proposed that the identity of children's friends is related to their emotion regulation in late childhood, such that friends who engage in positive behaviors socialize adaptive skills and competencies, and friends who engage in negative, deviant behaviors socialize maladaptive competencies, thus leading to declines in emotion regulation.

Gender effects. Sex differences have been thoroughly examined in the peer literature. Same-sex play preferences start as early as 3 years, tend to be highest between ages 6 to 11, and continue into adolescence (Maccoby, 1990). In a review of the peer relationship literature, Rose and Rudolph (2006) found that sex differences pervade numerous aspects of the peer relationship. Sex differences emerge in the structure of

children's peer interactions and these differences become stronger with age. Boys focus on hierarchies in relationships and have control and status-oriented goals and girls' interactions are more intimate and empathetic. Girls also report receiving more loyalty, validation, and acceptance in their friendships than boys.

In their review, Rose and Rudolph (2006) proposed a model of how sex differences impact peer relationship processes, citing that exposure to same sex peers leads to sex-typed styles of peer relations, means of coping, and rewards from the friendship. This in turn leads to sex-linked implications for emotional and behavioral outcomes across development. These sex-linked outcomes include emotional problems for girls such as anxiety, depression, and low self-esteem which in turn buffer against antisocial behavior. The reverse is true for boys as more antisocial outcomes serve as a buffering effect for emotional problems. Therefore, exposure to same sex peers is associated with sex-linked outcomes.

The findings of this review not only provide compelling information for how sex-typed interactions may be related to adjustment or maladjustment, but they also suggest that peer influences may differ for boys and girls. It is possible, for example, that positive friendship influences towards adaptive behaviors and more effective emotion regulation may be strongest for girls and negative influences like deviancy training may be strongest for boys. Negative influences may be particularly salient for boys as males are more likely to conform to peer pressure for antisocial behavior (Brown et al., 1986; Steinberg & Monahan, 2007). In fact, Fabes and colleagues (2012) found that, for girls, the association between affiliation with prosocial peers and increases in positive

emotionality was stronger, and that a lack of prosocial peer affiliation was more strongly related to increases in negative emotionality for boys. This provides further support for the concept that boys and girls are influenced in gender-stereotypic ways, and that the *processes* by which friends influence emotion regulation may function differently by gender.

CHAPTER III

AIMS AND HYPOTHESES

Research Goals and Hypotheses

Several research questions emerged from the proposed model of the changing influence from caregivers to friends on the development of emotion regulation in childhood (see Figure 1). Research has established the influence of caregivers on emotion regulation, and therefore the current study focused on the influence of friend behavior on emotion regulation. The study examined emotion regulation, behavioral adjustment, and friend behaviors from ages 5 to 10, as past research has highlighted the importance of assessing these constructs during school entry, and cascading influences from child characteristics to peer relations have been found during this period (Blandon et al., 2010). The subsequent, outlined goals resulted in directional, testable hypotheses. Path diagrams of these associations were proposed and latent models were examined. Research has provided some evidence for gender differences in domains of emotion regulation, behavioral adjustment, and friendship. Therefore, whether structural models differ for boys and girls was also examined.

Aim 1: To examine the stability of emotion regulation from early to late childhood

Research has demonstrated stability in emotion regulation over time (Raffaelli et al., 2005). The initial goal of this study was to examine whether early emotion regulation is associated with later emotion regulation in childhood. *It was hypothesized that*

emotion regulation at the age of 5 would be associated with emotion regulation at the age of 7, which in turn would be associated with emotion regulation at age 10. The stability of physiological and behavioral indicators of regulation was examined separately.

Aim 2: To examine the relation between emotion regulation and behavioral adjustment

External influences on the development of emotion regulation have received attention, as those factors that contribute to individual variation in emotion regulation in turn impact children's behavioral adjustment. A broad literature of research has identified the effect of emotion regulation on children's behavior problems and social competence. *It was hypothesized that emotion regulation at age 5 would have a direct effect on aggression and social competence at age 7, such that emotion regulation would be positively associated with social competence and negatively associated with aggression*. Again, these associations were assessed separately for physiological and behavioral indices of regulation.

Aim 3: To examine the relation between behavioral adjustment and friend behavior

Children's success at navigating social interactions and their overall behavioral adjustment is related to peer's perceptions of them and influences those peers that are available to form friendships with. As children tend to form friendships based on homophily, children who engage in adaptive behaviors are likely to befriend children who engage in similar, positive behaviors. *It was hypothesized that children's behavioral adjustment at age 7 would have a direct effect on friend behavior in second grade, such*

that children's aggression would be negatively related to their friend's adaptive behaviors in second grade and children's social competence would be positively related to their friend's adaptive behaviors. In contrast, those children who possess poor social skills and engage in aggressive behavior would be more likely to form mutual friendships with children who engage in similarly maladaptive behaviors.

Aim 4: To examine the effect of friend behavior on emotion regulation

There has been a paucity of research examining the development of emotion regulation in late childhood and the factors that contribute to individual differences in regulation during this period. A fundamental question that was assessed was whether the identity of children's friends contributes to their ongoing emotion regulation. *It was hypothesized that friend behavior in second grade would be directly associated with emotion regulation at age 10, such that children's friends' adaptive behavior would be associated with increased emotion regulation at age 10.*

Aim 5: To examine the effect of gender on the above processes

There is research to suggest that the above predictions may vary by gender. Specifically, *it was hypothesized that the association between emotion regulation and behavioral adjustment (aggression and social competence) would be stronger in magnitude for girls.* Further, it has been suggested that interactions with same sex peers leads to sex-typed styles of peer relations, in turn leading to sex-linked implications for emotional and behavioral outcomes (Rose and Rudolph, 2006). This research suggests that girls may be more affected by the influence of friends who exhibit positive characteristics and buffered from negative influences and boys may be more susceptible

to the influence of deviant peers. *It was hypothesized that the association of positive friend behaviors and emotion regulation at 10 year would be significant for girls, and that the association between negative friend behaviors and emotion regulation would be significant for boys.* The influence of gender was examined by testing for gender invariance in the structural model.

CHAPTER IV

METHODS

Recruitment and Attrition

Data came from three cohorts of children participating in an ongoing longitudinal study. The goal for recruitment was to obtain a sample of children who were at risk for developing future externalizing behavior problems that represented the surrounding community in terms of race and socioeconomic status (SES). All cohorts were recruited through child day care centers, the County Health Department, and the local Women, Infants, and Children program. Potential participants for two cohorts were recruited at 2 years of age (Cohort 1, 1994-1996; Cohort 2, 2000-2001) and screened using the Child Behavior Checklist (CBCL; Achenbach, 1992) completed by the mother in order to oversample for externalizing behavior problems. Children were identified as being at risk for future externalizing behaviors if they received an externalizing *T* score of 60 or above. Efforts were made to obtain approximately equal numbers of males and females. A total of 307 children were selected. The third cohort was initially recruited when infants were 6 months of age (in 1998) for their level of frustration based on laboratory observation and parent report and followed through the toddler period (for more information, see Calkins, Dedmon, Gill, Lomax, & Johnson, 2002). From Cohort 3, children whose mothers' completed the CBCL at 2 years of age were included in the current study ($n = 140$). Of the entire sample ($N = 447$), 37% of the children were

identified as being at risk for future externalizing problems at age 2. There were no significant demographic differences between cohorts with regard to gender, χ^2 (2, N = 447) = 0.63, p = .73, race, χ^2 (2, N = 447) = 1.13, p = .57, or 2-year socioeconomic status, F (2, 444) = 0.53, p = .59. The third cohort had significantly lower average 2-year externalizing T scores (M = 50.36) compared to cohorts 1 and 2 (M = 54.49), t (445) = -4.32, p < .01. Overall, from one assessment to the next, there was no systematic attrition by race, 2-year SES or 2-year externalizing scores.

Participants

Based on available data over time, 406 children were used in the current sample (189 male, 217 female). The 5, 7, and 10 year assessment points were examined in the current study. At the 5, 7, and 10 year laboratory visits, children's average age was as follows: 68 months (SD = 3.25); 92 months (SD= 4.31); and, 128 months (SD= 3.58), respectively. At the 5 year laboratory visit, 67 % were European American, 27% African American, 4% biracial, and 2% Hispanic. At the 5 year visit, families were economically diverse; Hollingshead (1975) SES scores for our sample ranged from 14-66 (M = 43.02, SD = 10.45) and scores ranging from 40 to 54 are representative of the middle class. Average SES scores for the 7 and 10 year visits were, respectively: 44.78 (SD = 11.77) and 44.28 (SD = 12.05).

Procedures

Participants and their mothers came to the lab at ages 5, 7, and 10. They completed multiple assessments including tasks with the child alone or with an experimenter and mother-child interaction tasks. Cardiac vagal regulation was assessed

during all of the described tasks. Only the assessments that are applicable to the current study are described; however, it is important to note that during all laboratory visits neutral or positive tasks occurred between baseline and frustration tasks. Mothers also completed questionnaires about children's behavior at the 5, 7, and 10 year assessment points. These maternal reports were used to measure behavioral indicators of regulation (at 5, 7, and 10 year), child aggression (7 year), and social competence (7 year). In second grade, a sociometric interview was conducted with the participant and the children in their classroom. Procedures were the same for all cohorts of children unless otherwise noted.

5 Year Assessment

Baseline cardiac activity was assessed at the beginning of the visit during the Spot the Dog video. The child watched a video of Spot the Dog, a short story about a puppy exploring a neighborhood, for 5 minutes while their mother sat nearby. The child also completed two puzzles and both the mom and child were instructed to let the child solve the puzzles on their own. The child had 2 minutes to build the first puzzle and 4 minutes for the second, more difficult puzzle. The puzzle task was used to assess physiological regulation.

7 Year Assessment

Baseline cardiac activity was assessed during the beginning of the visit. The child was asked to sit still for 2 minutes. Later during the visit, the child completed a difficult puzzle task which was used to assess physiological regulation. The puzzle and pieces

were inside a constructed box where children could put their hands in and feel, but not see, the pieces. The child was alone and had 5 minutes to complete the task.

2nd Grade Assessment

When participants were in second grade, about 7 years old, a sociometric interview was conducted in the child's classroom. The participant child and those children in the participant's classroom whose parents consented to the sociometric assessment completed the sociometric interview for those children in their classroom. A modified version of Coie, Dodge, and Coppotelli's (1982) procedure was used. During the sociometric interview, a graduate student or trained undergraduate student privately interviewed each child and also provided pictures of classmates to ensure the reliability of nominations. Children were asked to provide several sociometric nominations. Children were asked to nominate the three peers they "liked most" in their classroom. In addition, children were asked to nominate classmates for several categories, the following of which were assessed in this study*: Kids who share, Kids who are leaders, Kids who are smart, Kids who fight, Kids who act wild,* and*. Kids who are bossy.*

10 Year Assessment

Baseline cardiac activity was assessed during the beginning of the visit by asking the child to sit still for 4 minutes. Similar to the 7 year visit, a 5 minute difficult puzzle task was used to assess physiological regulation. The participant completed a puzzle alone for which they could only feel, but not see, the pieces.

Measures

Indicators of Emotion Regulation

Physiological and behavioral indicators of emotion regulation were assessed at ages 5, 7, and 10. The physiological indicator of regulation was indexed by ANS reactivity and the behavioral indicated regulation was assessed by maternal report.

Physiological. Participant's cardiac vagal regulation (RSA) was collected as a physiological indicator of emotion regulation at the 5, 7, and 10 year assessments. To measure vagal tone in the laboratory the experimenter placed three electrodes in an inverted triangle pattern on the child's chest. The electrodes were connected to a preamplifier, the output of which was transmitted to a vagal tone monitor (VTM-I, Delta Biometrics, Inc, Bethesda, MD) for R-wave detection. The vagal tone monitor displayed ongoing heart rate and computed and displayed an estimate of RSA (vagal tone) every 30 seconds. A data file containing the interbeat intervals (IBIs) for the entire period of collection was transferred to a computer for later artifact editing (resulting from child movement) with MXEdit for the 5, 7, and part of the 10 year data. The Cardiobatch program, along with a MatLab algorithm was used for artifact editing for some of the participants at age 10, which uses a comparable algorithm to edit and calculate IBIs.

Physiological arousal of autonomic activity was measured in terms of baseline patterns of vagal tone during the video presentation at the 5 year assessment, and during the 2 and 4 minute baseline tasks at the 7 and 10 year assessments, respectively. Suppression scores of vagal withdrawal were calculated based on a difference score of

mean vagal tone in the puzzle task from the mean baseline score. A positive score indicates an increase in RSA suppression and more effective physiological regulation.

Behavioral. Mothers completed the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997) which assessed parents' perceptions of their child's emotion regulation and emotionality. The ERC is a 24-item questionnaire with items rated on a 4-point Likert scale indicating the frequency of behaviors from 1 (never) to 4 (always) scale. This measure yields two subscales, Negativity/Lability and Emotion Regulation. The Emotion Regulation scale was used in the current study as an index of the behavioral manifestation of emotion regulation. The Regulation scale contains 8 items that refer to the child's ability to modulate emotional reactivity. Items on this scale include *"Is a cheerful child*," "*Responds positively when adults talk to or pay attention to her/him*," and *"Can say when s/he is sad, angry, mad, fearful, or afraid*." Items were recoded so that higher scores indicate better emotion regulation. The Emotion Regulation subscale has good internal consistency (α = .83; Shields & Cicchetti, 1997).

Behavioral Adjustment

Children's behavioral adjustment, as measured by maternal report of externalizing behavior and social competence, was assessed when children were 7 years old.

Aggression. Maternal report of children's aggression was assessed at age 7 with the Behavioral Assessment System for Children, 2nd edition, Parent Rating Scales-Child, ages 6-11 (BASC-2-PRS-C; Reynolds, & Kamphaus, 2004). The BASC-2-PRS-C is a 160 item behavioral rating scale on which mothers rate the frequency of their child's behavior ranging from 0 (*Never*) to 3 (*Almost Always*). The BASC-2-PRS-C yields 4

composites and 15 subscales. The Aggression general T score was used to assess disruptive behavior, which is comprised of the Conduct Problems, Hyperactivity, and Aggression subscales. This composite has demonstrated good internal consistency (α = .92) and test-retest reliability (r = .91).

Social competence. Maternal report of children's social competence was assessed at age 7 with the Social Skills Rating System, Elementary Level, Parent Form (SSRS; Gresham, & Elliot, 1990). The SSRS is a 57 item measure on which mothers rate the frequency of their child's social, academic, and problem behaviors ranging from 0 (*Never*) to 2 (*Very Often*). Of the 55 items, 38 of these items assess social skills and 27 assess problem behaviors and academic competence. The Total Social Skills Scale raw score was used, which is comprised of the Cooperation, Assertion, and Self-Control subscales. The internal reliability of the Total Scale is α = .87, and the test-retest reliability of this scale is r = .87 (Gresham & Elliot, 1990).

Friend Behavior

To assess the characteristics of children's friends, a dataset containing sociometric information on participant's mutual friends was used. This dataset includes the participant's own sociometric status and nominations, along with the sociometric status of their mutual friends. When the children who the participant nominated as "likes most" reciprocally nominated the participant for their own rating of "likes most" then this was considered a match for mutual friendship. Given that the participant gave three nominations for "likes most," the dataset could contain up to three mutual friends. Where mutual friendship was established, the dataset also contains information on the friend's

sociometric status. Six sociometric nominations were of interest for the current study. The first three nominations assessed positive friend behaviors. *Shares*, asked children "Some kids are really good to have in your class because they work together, help others, and share. They let other kids have a turn. Who are the kids who cooperate, help, and share?" For *Leaders,* children were asked "Who are the kids in your class who are leaders, the kids who others look up to?" When asked the *Smart* item, children were told, "Some kids do very well at school and earn high grades. Who are the smart kids in your class?" The last three items used in the current study assessed negative, maladaptive behaviors. *Fights*, asked children, "Some kids start fights, say mean things, and hit other kids. Who are the kids who start fights and say mean things?" *Acts Wild* asked children, "Some kids get out of their seats a lot, act wild, and make a lot of noise. They bother people who are trying to do work. Who are the kids that get out of their seats and bother people?" Lastly, *Bossy*, asked, "Some kids boss other kids around. They always have to have things their own way, never listen, and tell other kids what to do. Who are the kids that boss other kids around?"

The sociometric nominations on each item were determined by computing z-scores within classrooms to provide peer-reported indices of behavior for each mutual friend. For the proposed study, these nominations were looked at in two ways. The scores for each nomination across the number of mutual friends reported (up to three) were averaged. For analyses that included one latent factor of friend behavior, the positive identity of participant's mutual friends was measured by reverse scoring the *Fights*, *Acts Wild,* and *Bossy* nominations. This resulted in 6 scores for each participant

who had at least one mutual friend: *Shares, Leaders, Smart, Fights* (reverse scored)*, Acts Wild* (reverse scored)*,* and *Bossy* (reverse scored). These 6 scores were loaded onto a Friendship Behavior latent variable; such that high scores on this variable indicate adaptive, positive behaviors of mutual friends and low scores indicate maladaptive friend behaviors. For analyses that included two latent factors of friend behavior (one positive and one negative), the averaged nominations were used, but the *Fights*, *Acts Wild,* and *Bossy* nominations were not reverse scored.

CHAPTER V

RESULTS

Analytic Approach

Models were estimated using Mplus v. 6.11(Muthén & Muthén, 2007) and full information maximum likelihood (FIML) estimation was used to handle incomplete data. FIML is considered an appropriate approach to address missing data. It has been shown to produce unbiased parameter estimates when data is missing at random, missing completely at random, when data is nonignorable, and when the amount of missingness is large (e.g., > 25%; Newsom, 2012; Collins, Schafer & Kam, 2001; Graham, 2003). For adequate power, Kenny (2012) suggests a sample size of at least 200 for SEM models, particularly those with latent factors. The lowest sample size for the described analyses was 214 and sample sizes for models were typically towards 300. As such, the current sample had enough power to detect effects.

Models were tested in a series of steps. First, two latent models of friend behavior were tested with confirmatory factor analysis. In the one factor model, friend behavior was assessed as a latent factor composed of the following sociometric nominations in second grade: *Shares*, *Leaders*, *Smart*, *Fights*, *Acts Wild*, and *Bossy*. The latter three variables (*Fights*, *Acts Wild*, and *Bossy*) were reverse scored such that high scores on the one factor model were indicative of adaptive friend characteristics. A second, two factor model of friend behavior was examined. The first factor consisted of

the three positive friend characteristics (*Shares*, *Leaders*, *Smart*) and the second factor included the three negative friend characteristics (*Fights*, *Acts Wild*, and *Bossy*). The negative friend characteristics were not reverse scored and the two factors were allowed to correlate.

Next, the stability of physiological and behavior indicators of emotion regulation from early to late childhood was examined. Separate path analyses were conducted assessing the direct effect of emotion regulation at age 5 on emotion regulation at age 7 and the direct effect of emotion regulation at age 7 on emotion regulation at age 10. Two separate path analyses examined the stability of the physiological index of regulation (vagal withdrawal) from 5 to 10, and the stability of the behavioral index of regulation (the ERC regulation subscale) from 5 to 10. Then, subsequent physiological and behavioral full models were conducted examining the following paths over and above the stability of emotion regulation from 5 to 10. Within the full model, maternal report of child aggression and social competence at age 7 was regressed on emotion regulation at age 5 and aggression and social competence were allowed to correlate. Friend behavior in second grade was regressed on aggression and social competence and emotion regulation at age 10 was regressed on second grade friend behavior. These full models were examined first with the one factor latent variable and then with the two factor latent variable of friend behavior.

The influence of gender was also examined. To avoid issues of power from splitting the sample by gender, a multiple sample path analysis was examined to test for moderation by gender. In a multiple sample path analysis, gender is used as a grouping

variable and completely restricted and unrestricted models are compared. In the completely restricted model, all parameters are constrained to be equal for boys and girls, whereas the unrestricted model allows the structural parameters to differ by gender. A significant difference between these two models in model fit indicates moderation by gender in at least one path. If a significant difference is found, follow up analyses are done to determine which paths differ by gender.

Preliminary analyses were conducted to examine descriptive information and correlations for study variables (see Tables 1 and 2, respectively). The behavioral and physiological indicators were not correlated. Aggression and social competence were negatively, significantly related to one another and significantly correlated in the expected direction with the behavioral indicator of emotion regulation at all time points, but neither aspect of child behavior was significantly associated with vagal withdrawal. All sociometric friend variables were significantly correlated with each other in the expected direction.

Confirmatory Factor Analysis

The single factor latent model of friend behavior in second grade did not demonstrate strong fit (χ^2 (9, N= 214) = 203.09, p < .001, CFI = .75, RMSEA = .32, SRMR = .10; see Figure 2); however, all factor loadings were significant at the $p < .001$ level. The nominations of *Shares*, *Leaders*, and *Smart* had standardized factor loadings of .80, .50, and .69; $p < .001$, respectively. The reversed scored nominations of *Fights*, *Acts wild*, and *Bossy* also had adequate loadings of .85, .86, and .61; $p < .001$, respectively.

The two factor latent model of friend behavior had somewhat more favorable fit (χ^2 (8, N= 214) = 59.10, p < .001, CFI = .93, RMSEA = .17, SRMR = .06; see Figure 3). The loadings on both the positive and negative friend behavior latent factors were significant at the $p < .001$ level. The standardized factor loadings for the positive factor were as follows: *Shares* = .91, *Leaders* = .65, and *Smart* = .85. The standardized factor loadings for the negative factor were: *Fights* = .95, *Acts Wild* = .83, and *Bossy* = .70. The positive and negative friend behavior factors were significantly, negatively, correlated; $r = -.68$, $p < .001$.

Structural Model Comparisons

Stability Models

Prior to examining the full model, stability models estimating emotion regulation indices from age 5 to 10 were examined. The physiological model assessing the stability of vagal withdrawal demonstrated significant but low stability from age 5 to 10 (see Figure 4). The standardized path coefficients from 5 year to 7 year ($\beta = .15$, $p < .05$) and from 7 year to 10 year ($\beta = .20$, $p < .01$) were comparable, indicating stable but low consistency of vagal withdrawal during childhood. Model fit was adequate (χ^2 (1, N= 298) = 2.33, p > .05, CFI = .88, RMSEA = .07, SRMR = .03). The behavioral stability model demonstrated adequate model fit (χ^2 (1, N= 279) = 10.99, p < .001, CFI = .95, RMSEA = .19, SRMR = .05; see Figure 5). Standardized path coefficients for the behavioral indicator of emotion regulation from ages 5 to 7 and 7 to 10 were high but declined ($\beta = .65$ and .50, $p < .001$, respectively).

Physiological Indicator of Regulation

The model fit of the full physiological model examining the single factor latent variable of friend behavior was poor (χ^2 (41, N= 275) = 196.28, p < .001, CFI = .78, RMSEA = .12, SRMR = .07; see Figure 6). Vagal withdrawal at 5 year was associated with 7 year vagal withdrawal ($\beta = 0.15$, $p < .05$) and 7 year withdrawal was associated with 10 year vagal withdrawal ($\beta = 0.20$, $p < .01$). With the exception of the established stability paths, no additional hypothesized paths were significant. Vagal withdrawal at 5 was not associated with 7 year maternal report of children behavior in terms of aggression ($\beta = 0.01$, $p > .05$) and social competence ($\beta = -0.09$, $p > .05$). Further, 7 year child aggression ($\beta = 0.03$, $p > .05$) and social competence ($\beta = 0.09$, $p > .05$) was not related to second grade friend behavior which in turn was not associated with vagal withdrawal at age 10 ($\beta = 0.02$, $p > .05$).

In terms of the two factor friend behavior full model, the model fit was strong (χ^2 (37, N= 275) = 61.67, p < .01, CFI = .97, RMSEA = .05, SRMR = .06). The two factor model did not yield any significant paths beyond what already emerged in the single factor model (see Figure 7). The physiological index of regulation at 5 years was not associated with 7 year aggression or social skills ($\beta = 0.01$ and -0.09, $p > .05$, respectively). Aggression was not associated with positive friend behavior ($\beta = 0.04$, $p > .05$) or negative friend behavior ($\beta = -0.01$, $p > .05$) and social competence was similarly not related to positive or negative friend behavior ($\beta = 0.14$ and -0.02, $p > .05$, respectively). Finally, both positive friend behavior ($\beta = 0.00$, $p > .05$) and negative

friend behavior (β = -0.02, p > .05) were not associated with the physiological index of emotion regulation at age 10, over and ability the stability of regulation from age 5 to 10.

In sum, regardless of whether the single or two factor latent model of friend behavior was examined, the full physiological model did not yield significant results over and above the stability model. Though the physiological indicator of emotion regulation demonstrated low levels of stability from 5 to 10 years, 5 year vagal withdrawal did not contribute to the development of child behaviors which in turn were not associated with friend characteristics and therefore did not impact vagal withdrawal at 10.

Behavioral Indicator of Emotion Regulation

The model fit of the single factor full model assessing maternal report of behavioral indices of regulation was not strong (χ^2 (41, N= 326) = 299.99, p < .001, CFI = .76, RMSEA = .14, SRMR = .09); however, the hypothesized pathways were significant (see Figure 8). Maternal report of regulation on the ERC was stable from 5 to 7 years (β = .63, p < .001) and from 7 to 10 (β = .52, p < .001). The behavioral indicator of emotion regulation at age 5 was associated with 7 year aggression (β = -0.26, p < .001) and 7 year social skills (β = 0.47, p < .001). The path from 7 year aggression to second grade friend behavior was not significant (β = .03, p > .05); however, social competence at age 7 was significantly associated with friend behavior in second grade (β = .16, p < .05). Finally, friend behavior was associated with emotion regulation at 10 (β = .18, p = .01).

The model fit of the two factor full model assessing maternal report of behavioral regulation was adequate (χ^2 (37, N= 326) =152.17 p < .001, CFI = .90, RMSEA = .10,

SRMR = .07; see Figure 9). As with the one factor model, maternal report of regulation on the ERC was stable from 5 to 7 years (β = .63, p < .001) and from 7 to 10 (β = .50, p < .001). Similarly, the behavioral index of regulation was positively related to 7 year social skills (β = .47, p < .001) and negatively related to 7 year aggression (β = -.26, p < .001). Interestingly, neither social comptence nor aggression at age 7 were associated with negative friend behavior in second grade (β = -.08 and -.02, p > .05, respectively). Further, negative friend behavior in second grade was not associated with 10 year regulation (β = .06, p > .05). In comparison, although aggression was not significantly associated with positive friend behavior (β = .03, p > .05), social competence was significantly and positively associated with positive friend behavior in second grade (β = .21, p < .01). Positive friend behavior in second grade was significantly associated with the behavioral index of emotion regulation at age 10 (β = .26, p < .05).

In summary, the behavioral indicator of emotion regulation demonstrated stability from ages 5 to 10. Regulation at age 5 was associated with lower levels of aggression and greater levels of social competence when children were 7. For the model examining the single latent factor of friend behavior, aggression was not associated with friend behavior, but maternal report of children's social skills at age 7 was related to the characteristics of children's mutual friends in second grade. When mothers rated their children as having good social skills, their children's mutual friends were more likely to exhibit higher levels of adaptive behaviors and lower levels of maladaptive behaviors as rated by their classmates. This model also yielded a significant association between second grade friend behavior and emotion regulation at age 10, such that children who

had friends with positive characteristics were rated by their mothers as having increases in the behavioral indicator of regulation 3 years later, over and above the contribution of the stability of regulation.

Interestingly, the two factor model revealed more information about these paths. The association between social skills and friend behavior was only found for the positive friend behavior factor, indicating that children with better social competence are more likely to befriend peers with adaptive characteristics. These results suggest that children with higher levels of aggression and lower levels of social competence are not more likely to have mutual friends with more undesirable characteristics. Further, positive friend behavior, but not negative friend behavior, was associated with individual differences in the behavioral indicator of emotion regulation at age 10. Therefore, the significant paths from child social competence to friend behavior to the behavioral index of regulation emerged only when assessing adaptive traits of children's mutual friends.

Structural Gender Invariance

Tests of gender invariance were conducted to explore whether there were significant gender differences on path coefficients in the full structural model. The two factor latent model of friend behavior was included, as fit indices for the two factor model were stronger than for the single factor model for both the physiological and behavioral models. For both two factor full models (physiological and behavioral), a fully constrained model in which all paths were set equal was compared to baseline model where all relevant structural paths were free to be estimated for boys and girls.

With regard to the physiological model, based on the chi-square difference ($\Delta\chi^2$ (15) = 18.71, $p > .05$), the structural paths did not significantly differ for males and females and no follow up analyses were conducted. In contrast, chi square difference tests for the behavior model invariance test revealed that paths did significantly differ by gender ($\Delta\chi2$ (15) = 28.84, $p < .05$). Follow up analyses indicate that, for boys, all of the paths are similar to model for the full sample; however, the path from 7 year social skills to positive friend behavior was not significant ($\beta = .12$, $p > .05$; see Figure 10). For boys, while early the behavioral indicator of regulation contributed to higher levels of social competence ($\beta = .46$, $p < .001$) and lower levels of aggression ($\beta = -.21$, $p < .001$), these enhanced skills do not contribute to the development of friendships with positive peers. The significant association between positive friend behavior and emotion regulation at age 10 for boys ($\beta = .36$, $p < .001$) indicates that boys' mutual friends who engage in adaptive behaviors may socialize them toward better behavioral aspects of regulation.

In terms of the structural paths for girls, as with the full model, the behavioral indicator of emotion regulation at age 5 year was associated with greater levels of social competence ($\beta = .47$, $p < .001$) and lower levels of aggression ($\beta = -.24$, $p < .001$; See Figure 11). Also consistent with the structural model for the full sample, social competence at age 7 was associated with positive friend behavior ($\beta = .22$, $p < .05$). A difference from the full sample is that, for girls, social competence was also significantly associated with the negative friend behavior latent variable ($\beta = -.21$, $p < .05$). Further, results indicate that neither the positive nor negative friend factor was associated with 10 year regulation for girls ($\beta = -.02$ and $-.11$, $p > .05$, respectively). Therefore, results

indicate that girls with increased social competence at age 7 are more likely to have mutual friends who possess positive traits and less likely to have mutual friends who are rated by peers as engaging in negative behaviors in second grade. In contrast to the full sample, these friend behaviors did not predict behavioral indicators of regulation at age 10 over and above the stability of regulation from age 5.

CHAPTER VI

DISCUSSION

Though peers have been suggested as an extrinsic influence in the socialization of emotion regulation (Fox & Calkins, 2003), caregiver influences have received the majority of the attention in the literature. Within the lens of social learning theory, friends are expected to socialize emotion regulation in middle to late childhood, as children spend more time in school and outside of the home (Bandura, 1977; Larson & Richards, 1991). The goal of the current study was to assess the stability of emotion regulation across childhood and examine the socialization of emotion regulation by friends. This latter goal was evaluated through a structural model of emotion regulation from age 5 to 10 examining the association between emotion regulation and child behavior, child behavior and friend behavior, and friend behavior and emotion regulation. It was hypothesized that, through selection effects, children with poor emotion regulation would befriend peers with similar deficits and thereby be further socialized towards poor emotion regulation.

To test the study hypotheses, latent models were examined. Two latent models of friend behavior were created: a single factor model that included sociometric nominations of children's mutual friends in 6 domains and a two factor model that divided these 6 domains into positive and negative friend behaviors. For the single factor model, all 6 domains significantly loaded on the friend behavior latent variable such that

high scores on the friend behavior variable indicated high levels of adaptive characteristics of participants' mutual friends. For all 6 domains, factor loadings were moderate to high, ranging from .50 to .86. The two factor model evidenced stronger fit indices and factor loadings ranged from .65 to .95. The positive and negative friend latent factors were significantly and negatively correlated. Both the one and two factor models were examined in the full models, allowing for an analysis of whether the hypothesized paths differ for positive and negative friend influences, particularly with regard to gender.

The stability of emotion regulation from 5 to 10 years was examined. Both the physiological and behavioral indicators of emotion regulation demonstrated stability. Vagal withdrawal demonstrated low but significant levels of stability (5 to 7 years, β = .15, 7 to 10 years, β = .20). Previous work has examined the stability of vagal regulation during early childhood and the magnitude of the stability coefficients in the current study is consistent with previous studies. An examination of the stability of RSA suppression (vagal withdrawal) scores across a number of tasks from ages 2 to 5 found low to moderate coefficients ranging from .17 to .33, which may be attributed to the shift toward behavioral regulation in early childhood (Calkins & Keane, 2004). Similarly, a separate study examining the stability of vagal regulation to frustration from 2 to 4 years and 5 to 7 years found associations comparable in magnitude (β = .18 and .28, respectively; Perry, Mackler, and Calkins, *under review*).

As expected, the behavioral index of regulation demonstrated high stability over time. This is consistent with other studies, which have found that, after infancy,

individual differences in children's self regulation are thought to be fairly stable (Eisenberg, Spinrad, & Eggum, 2010). The behavioral indicator of emotion regulation was less stable from 7 to 10 years than from 5 to 7 years. This may speak to the contribution of other influences, such as peers. Friendships are thought to become more stable with age (Poulin & Chan, 2010), and it may be inferred that the influence of friends becomes more powerful as relationships become more stable. It is particularly compelling that individual differences in the behavioral indicator of regulation through the age of 10 could be modeled over and above the considerable theoretical and observed stability of emotion regulation.

Consistent with the study's hypotheses, the behavioral index of regulation at age 5 was associated with 7 year aggression and social competence, such that high levels of regulation were associated with better social skills and lower levels of aggression. In turn, these child characteristics were associated with the identity of children's mutual friends in second grade. As predicted, children who were more socially skilled and less aggressive befriended other children who similarly engaged in positive behaviors. This finding is consistent with research on homophily; children befriend peers that are similar to them (Steinberg & Monahan, 2007). Through assortative pairing children who are similar on mutually important traits enter into a relationship (Kandel, 1978). When children are socially skilled and have few behavior problems, this serves as an asset; they befriend similarly well adapted peers.

Based on results for the two factor model, it appears that this process only occurs for positive friend behaviors and the associations between aggression and social

competence at age 7 and negative friend characteristics in second grade were not significant. Therefore, results indicate that children who have good social skills are more likely to have mutual friends who possess positive traits, and, conversely, those children with poor social skills are more likely to befriend peers who are low on positive characteristics, but they are not more likely to befriend peers who engage in maladaptive behaviors. In turn, the association between positive friend behavior and the behavioral indicator of regulation at age 10 was significant. Those friends who have positive traits socialize effective behavioral aspects of regulation and those friends lacking in positive characteristics contribute to decreases in regulation. These findings are consistent with social learning theory and with models of the development of emotion regulation, both of which emphasize the influence of external factors (Bandura, 1977; Calkins, 1994). Relationships have been considered both the inputs and outputs of emotion regulation (Bell & Calkins, 2000) and social learning theory posits that functioning is determined by reciprocal interactions between people and the environment (Bandura, 1977). In the current study, friends were identified as a model of regulatory behaviors. Through reinforcement by models (friends), these behaviors become internalized. As such, mutual friends socialized behavioral indices of regulation.

Overall, these findings suggest that, based on a series of associations set in motion through early regulatory abilities, children whose behavioral manifestations of emotion regulation are effective will experience gains in regulation. The nature of the examined model accounts for these associations over and above the stability of emotion regulation over time. As a result, these findings suggest that the socialization effect of friends on

emotion regulation occurs after accounting for selection effects. Therefore, it is not just that children form friendships with peers who have similar adaptive or maladaptive traits, but that their emotion regulation skills *worsen* or *improve* as a function of socialization with their friends. A similar phenomenon has been found in other work (e.g., Fabes, et al., 2012), suggesting that early selection effects set well adapted children on a course to be socialized towards adaptive traits by similar peers and poorly regulated children are socialized towards further maladaptive traits by peers with similar deficits.

In both the physiological and behavioral two factor models, children's social competence and aggression were not associated with the negative friend behavior factor. This is surprising, given the body of literature examining the association between negative child behaviors, including aggression and social deficits, and peer outcomes (e.g. Blandon et al., 2010; Keane & Calkins, 2004; Fabes et al., 2012). It was hypothesized that poor social competence would be associated with friendships with peers who engaged in maladaptive behaviors. It is possible; however, that aggressive or socially unskilled children suffer from peer rejection and have a limited peer group. For example, research suggests that rejected children evidence a number of deficits in social competencies (Volling, MacKinnon-Lewis, Rabiner, & Baradaran, 1993) and that aggression and dysregulation are associated with concurrent and future peer victimization (Hanish et al., 2004; Rosen, Milich, & Harris, 2012). Therefore, child maladjustment may be associated with peer rejection, rather than with friendships with peers who engage in negative behaviors. Further, an emerging body of research has assessed the impact of peer victimization on physiological factors such as heart rate (Sijtsema, Shoulberg, &

Murray-Close, 2010) and cortisol levels (Vaillancourt et al., 2008). This might also account for the lack of findings for the physiological model. Perhaps physiological indices of emotion regulation are impacted via negative peer interactions such as bullying, rather than through positive peer influences.

Another explanation for the lack of effects for aggression is that the study sample was a normative sample that did not display high levels of behavior problems. An analysis of the CBCL T scores for externalizing behavior at age 7 reveal that 98% of the sample fell below the borderline clinical range. Approximately 1% of the sample fell in the borderline clinical range, and 1% fell in the clinical range. The current study examined a community sample of children. The expected effects would likely emerge in a sample of children exhibiting high levels of behavior problems. Moreover, the general pattern of results may have been stronger in such a sample, as the current results appear to moreso reflect children's adaptive developmental pathways, given the high average ratings on the social competence and emotion regulation measures.

Overall, the physiological models did not demonstrate the expected effects. Based on polyvagal theory (Porges, 1995), it would be expected that early physiological indicators of regulation would be associated with behavioral adjustment and social competence. Polyvagal theory posits that the ability to engage or disengage with objects in the environment, which is necessary for social competence, is related to physiological regulation (Doussard-Roosevelt, Montgomery, & Porges, 2003; Porges, 1995). One explanation for the lack of effects is that the studied behavioral indicator of regulation is "external" and "observed" by others. Social learning theory purports that almost all

learning occurs through observation of interactions and noting the consequences of others' behaviors (Bandura, 1977). Therefore, as behaviors are apparent to others, they are not only more likely to contribute to friend selection but also to socialization. It is reasonable to assume that the principles of social learning theory would apply more to behavioral rather than physiological aspects of regulation, which are not as observable and thereby less likely to be reinforced by peers. While children can note the negative consequences of a friend's poorly regulated behavior, it may be more difficult for them to connect these consequences to physiological aspects of emotion regulation. Therefore, it may be more apparent to a child that poor behavioral regulation and regulatory strategies rather than physiological arousal resulted in a negative consequence.

Another explanation for the lack of effects for the physiological model is that this index of emotion regulation may be indicative of a child's temperament, a relatively stable construct. Calkins and Keane (2004) found that physiological regulation was modestly stable across tasks and over time, suggesting that physiological regulation may be "characteristic of the child." Physiological regulation has been conceptualized as a factor that is heavily influenced by biology and genetics (Calkins & Hill, 2007; Fox & Calkins, 2003), as opposed to behavioral aspects of regulation that are thought to be susceptible to extrinsic influences such as caregivers. Therefore, physiological regulation may be less susceptible to external influences, including peer socialization. This is not to say that physiological regulation is immune to influence, as Calkins (1994) acknowledges that each domain of regulation impacts the other. Rather, over and above the stability of regulation over time, biologically based aspects of regulation are likely not influenced in

as substantial a way as behavioral indices of regulation. Instead, it may be beneficial to consider the influence of physiological regulation as it contributes to the acquisition of behavioral regulation, as biological factors are thought to underlie the successful development of emotion regulation past infancy (Calkins & Keane, 2004; Fox & Calkins, 2003).

Although the results of the full behavioral model were consistent with the study's hypotheses, the test of gender invariance revealed that the behavioral model differed for boys and girls in an unexpected way. Although it was predicted that the association of early regulation and child behavior would differ for boys and girls, the association between emotion regulation at age 5 and aggression and social competence at age 7 was significant for both boys and girls. This is surprising, as it has been suggested that that association between regulation and aggression is stronger for girls (Roll et al., 2012), and there is research to suggest gender differences in the development of social competence (Hastings et al., 2007). Perhaps behavioral regulation is a strong predictor of adjustment, regardless of gender. There is certainly research that has not found gender differences in these associations (e.g., Sullivan, Helms, Kliewer, & Goodman, 2010).

Although the majority of paths were the same as for the full sample, 7 year social competence was not associated with second grade positive friend behavior for boys. It is curious that the association between positive friend behavior and the behavioral indicator of regulation at age 10 emerged, despite that neither aggression nor social skills were related to friend behavior. This may suggest that the process by which early regulation impacts friend selection may be different for boys. Results suggest that positive peer

influences result in increases in mother's ratings of behavioral indicators of regulation for boys. This is contrary to study predictions, as research has suggested that boys may be more susceptible to negative peer influence versus positive (e.g., Rose and Rudolph, 2006).

An analysis of the model for girls also reveals surprising findings. Social competence was a salient predictor of both positive and negative friend identity for girls. Higher social competence was associated with the development of mutual friendships with peers who were high on positive traits and low on negative traits. Contrary to the study's hypotheses, neither negative nor positive friend behavior were associated with differences in the behavioral index of regulation at age 10. Positive friend behavior in particular was expected to be related to changes in regulation for girls, as Rose and Rudolph (2006) suggest that positive influences may be more salient for girls than for boys. One possibility for why friend behavior did not influence regulation for girls is that friend behavior may only be associated with concurrent, but not future behavior. For example, in a sample of preschoolers, both boys' and girls' mutual friends' antisocial and prosocial behavior was associated current behavior but not behavior 2 years later (Eivers, Brendgen, Vitaro, & Borge, 2012).

Another explanation is that the aspects of friend behaviors that would favor girls' development of emotion regulation, such as interactions marked by prosocial behavior, intimacy, and empathy, do not emerge until later in development. In Rose and Rudolph's (2006) review of the literature on gender differences in peer relationships, these gender-specific interactional patterns were typically studied in later childhood and adolescence,

with most studies assessing these behaviors from third grade forward. The issue of developmental timing likely applies to the influence of friends, particularly for girls. A recent study examining primarily African American, high poverty children from age 11 to 18 found that girls had higher initial levels of peer influence than boys and that this influence increased through adolescence but boys' level of peer pressure stayed the same (Church et al., 2012). Although a gender-stereotypic effect has been found for peer influence on emotionality in children aged 3 to 6 years old (Fabes et al., 2012), the socialization of friends on emotion regulation strategies (versus general emotionality) may not emerge until preadolescence, and the potency of these influences may increase through adolescence for girls. An analysis of the proposed models into preadolescence may yield the expected influence of gender on friend socialization of emotion regulation.

Finally, the unexpected results for gender may be a function of the level of emotion regulation in the current sample. Boys at age 5, 7, and 10 evidenced lower levels of behavioral regulation than girls (age 5: $F = 12.75$, $p < .05$; age 7: $F = 3.58$, $p < .10$; age 10: $F = 3.79$, $p = .05$). Therefore, there may have been more room for boys to grow in their emotion regulation abilities and more opportunities for peer influence. Girls, on the other hand, may have developed regulatory abilities more quickly than boys, or they may exhibit more nuanced regulatory abilities as a function of friend influences that were not examined in the current study. Although the gender findings were contrary to predictions, the results for boys suggest that there may be more promising developmental outcome for boys who develop friendships with adaptive peers. Rather than the typical prognosis of high levels of behavior problems and worse behavioral

outcomes for boys, these results suggest that boys are amenable to positive friend influences, and can evidence increases in emotion regulation.

Limitations and Future Directions

A major limitation of the current study is that the behavioral model, for which second grade friend behavior was found to predict 10 year emotion regulation, is largely based on maternal report. All variables except for the latent factor, which was estimated based on peers' sociometric nominations, were determined by maternal report. A strength of the physiological model is that it is based on a laboratory index of regulation; however, the full physiological model did not yield the same results. It is possible that the behavioral model was consistent with hypotheses due to shared rater bias. If a mother perceives her child to have poor emotion regulation she likely perceives them to have poor social skills and have high rates of aggression. This is confirmed through analysis of the correlation table, which indicates that the behavioral index of emotion regulation was significantly correlated with social skills and aggression in the expected direction, but the association of physiological regulation with these child characteristics was not significant. It is also important to note that the behavioral indicator of emotion regulation, the regulation subscale of the ERC, is just that, an indicator of emotion regulation. This measure is a proxy for how successfully the child behaviorally regulates their emotions, rather than an analysis of the development of specific developmentally appropriate strategies.

Beyond examining the influence of friend behaviors on emotion regulation, consideration of additional aspects of the friendship when evaluating peer influence may

have strengthened the current study. In an examination of aggression from kindergarten to second grade, friend aggression was related to significant increases in children's aggression, but friendship quality served a protective role, such that children with good friendship quality had lower initial levels of aggression and a marginally smaller association between aggressive friends and later aggressive behavior (Salvas et al., 2011). In addition to a social learning perspective, Salvas and colleagues (2011) cite a social bonding explanation for why children, even in relationships with maladaptive peers, may still demonstrate positive interpersonal skills. Though it is compelling that friend behavior alone predicted changes in the behavioral indicator of regulation for the overall sample, follow up analyses by gender revealed a more complicated pattern of associations. A nuanced analysis of the characteristics of the friendship itself and the dynamics of this relationship may yield a greater understanding of the influence of friends on regulatory abilities. It may be that having a high quality relationship, even if a child's friend engages in maladaptive behavior, is a protective factor from adjustment problems.

A related limitation concerns the developmental timing of when friendship influence was examined. The closeness and intimacy of mutual friendships typically does not emerge until adolescence. Adolescent friendships exhibit greater positive engagement and more properties of intimate relationships such as similarity, closeness, and liking than do friendships in childhood (Newcomb & Bagwell, 1995). Although children may nominate and identify mutual friends, the nature of this friendship may not be as intimate and stable in middle childhood. Therefore, examination of mutual

friendships in adolescence may have yielded stronger findings. Examination of peer networks, the culture of peer norms in the classroom, or reference groups (groups the child does not belong to but that they identify as wanting to join, such as cliques) may more accurately reflect the peers that exert the greatest influence in childhood (Hartup, 2009).

A more sophisticated form of data analysis may have better parsed mutual friend influence, particularly for conflicting friend messages. Recent research has cautioned that statistical advances that take into account multiple socialization influences are required to examine the differing messages children may receive from their peer group (Brechwald & Prinstein, 2011). In the current study, children could have up to 3 mutual friends and the scores of these 3 friends were averaged for each of the 6 nominations. Theories of homophily would suggest that children's friends are more likely to be similar to one another than different (Steinberg & Monahan, 2007); however, it is still possible that participants could have had a diverse group of mutual friends. Within a potential group of 3 mutual friends, although 2 of those friends could be high on a positive characteristic such as being a leader, 1 friend could be very low on this same characteristic. By averaging the three friends' nominations across these characteristics, the nuances of these conflicting messages may have statistically been cancelled out. Little is currently known about how children and adolescents negotiate these conflicting messages and this is an area needing further study (Bechwald & Prinstein, 2011); however, these conflicting influences were not addressed in the current study. Although this is a weakness of the study, social learning theory posits that, in the face of conflicting

messages, those behaviors that are the most consistent are likely to be learned (Bandura, 1977; Brown, 2009). The latent factors examined in this study assessed the average identity of children's friends across a range of positive and negative characteristics, and may serve as at least a rudimentary way to ascertain the average type of influence children were exposed to in their friendships.

Across many of the models examined, model fit was not ideal according to standards recommended by Hu and Bentler (1999). Though this is a considerable limitation, researchers have cautioned against the use of "rules of thumb" in determining model fit (e.g., Marsh, Hau, & Wen, 2004; Nye & Drasgow, 2011). Specifically, Nye and Drasgow (2011) suggested that recommended cut offs for fitness indices including Chi Square, RMSEA, and CFI may not be appropriate in evaluations of confirmatory factor analysis, particularly when data may be nonnormal. In light of this, evaluation of model fit for the friend behavior latent factor may inappropriately indicate misfit, as the sociometric variables that contribute to the friend behavior factor are not expected to have a normal distribution. In fact, although within an acceptable range, the skewness of the *Fights*, *Acts wild*, and *Bossy* variables were the highest of all study variables. It is also possible that these issues may generalize to full SEM models, although this has not been tested (Nye & Drasgow, 2011).

Also contributing to model misfit is that there are many other factors that contribute to the development of emotion regulation into late childhood that were not examined in this study. Factors such as life stress, familial influence and parental monitoring, demographic variables, and psychopathology are just some of the possible

influences on the continued development of emotion regulation. This study only assessed one influence on individual differences in emotion regulation with the goal of maintaining parsimony in analyses. By examining other factors, particularly in early childhood, model fit may be improved as more of the variance in 10 year emotion regulation would be explained.

Although the above limitations are of important consideration, the current study yielded a number of interesting findings and suggests directions for future research. The influence of early friend behavior on emotion regulation was only found in the behavioral model and not in the physiological model. Early physiological regulation was not associated with social competence or aggression and therefore this index of emotion regulation did not influence the aspects of child adjustment that were predicted to be associated with friend selection and the development of positive peer relationships. This indicates that friend behavior alone does not predict later regulation; rather, a series of associations in early childhood contribute to the behaviors of mutual friends, which in turn contributes to enhanced or diminished regulatory abilities. In contrast, behavioral indicators of regulation at age 5 were associated with child adjustment, which therefore impacted friend selection and the behaviors which were socialized.

The current study examined a series of predicted associations, ranging from early to late childhood. An advantage of the tested models is that the processes through which early factors impact later outcomes can be considered while accounting for the stability of variables of interest. Formal developmental cascade models can best test these kinds of effects, which consider the developmental timing of factors and also the

bidirectionality of constructs (e.g., Blandon et al., 2010). An examination of cascading influences may be beneficial for future research, in determining the role of intrinsic aspects of regulation (e.g. physiological regulation) in the peer influence process. Polyvagal theory suggests that, the better the vagal system functions, the more organized and effective behavioral regulation will be for the individual (Doussard-Roosevelt et al., 2003) and biological factors are thought to underlie the successful development of self-regulation past infancy (Calkins & Keane, 2004; Fox & Calkins, 2003). Therefore, future research utilizing cascade models could examine the influence of physiological regulation as it contributes to the acquisition of behavioral regulation. Such a model would more fully capture the influence that multiple domains of emotion regulation exert on child outcomes and friend selection.

This study contributed to the field of emotion regulation in a number of ways. Few studies have assessed the influence of peers on emotion regulation. The majority of research on peer influence examines the impact of peers on depression, deviant behavior, or substance use (e.g., Conway, Rancourt, Adelman, Burk, & Prinstein, 2011; Giletta et al., 2012; Snyder et al., 2010). Peers have been cited as an area of unexplored influence in the development of emotion regulation (Thompson & Meyer, 2007). By utilizing a framework of selection and socialization effects and a social learning theory perspective, friends were identified as an influence on individual differences in behavioral indices of regulation, over and above the stability of regulation in childhood. This is also the first study to assess the stability of multiple indices of emotion regulation into late childhood. Emotion regulation is a fairly stable construct, but individual differences in regulation

continue to develop into adolescence, and peers are an understudied socialization agent in this process.

A biopsychosocial approach was utilized in the current study (Engel, 1977; 1980). By examining a biological factor (physiological regulation), psychological factors such as social competence and aggression, and the social influence of friends, a more full description of the development of regulation emerged than has been discussed in previous research. The current findings are a first step in examining the changing influences on emotion regulation from parents to peers. The results suggest that friends do play a role, through a series of influences beginning in early childhood, in determining which behaviors are socialized. Through future research, a better understanding of the multifaceted risk and resilience factors for boys and girls in the development of emotion regulation through their peer networks can be gained. Given the cycle of selection and socialization effects (e.g., children are likely to befriend peers similar on traits, and these traits are expected to be even more reinforced by these similar peers), the early acquisition of effective regulation strategies is paramount in setting children on an adaptive course through late childhood.

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APPENDIX A

TABLES AND FIGURES

Table 1. Descriptive Statistics for Overall Sample.

Measure	**N**	**M**	**SD**	**Range**	**Skewness**
Indictors of ER					
-Physiological 5 yr	288	0.25	0.72	-2.66-2.50	-0.08 (0.14)
-Physiological 7 yr	223	0.80	0.75	-1.15-3.72	0.81 (0.16)
-Physiological 10 yr	207	0.61	0.79	-2.75-3.00	-0.24 (0.17)
-Behavioral 5 yr	345	3.32	0.32	2.38-4.00	-0.16 (0.13)
-Behavioral 7 yr	327	3.40	0.35	2.25-4.00	-0.44 (0.14)
-Behavioral 10 yr	327	3.38	0.38	2.25-4.00	-0.41 (0.14)
Social Competence 7 yr	325	54.77	10.23	22.00-80.00	-0.24 (0.14)
Aggression 7 yr	323	45.43	8.95	30.00-76.00	0.50 (0.14)
Average 2nd Grade Friend Behavior					
-Shares	214	0.31	0.61	-1.13-1.62	-0.18 (0.17)
-Leaders	214	0.29	0.60	-1.05-1.63	0.07 (0.17)
-Smart	214	0.30	0.62	-1.16-1.58	-0.11 (0.17)
-Fights	214	-0.11	0.61	-1.14-2.20	0.92 (0.17)
-Acts Wild	214	-0.12	0.60	-1.11-2.07	0.97 (0.17)
-Bossy	214	-0.07	0.56	-0.95-1.69	0.87 (0.17)

Table 2. Correlations for Study Variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13
. Physiological ER 5 yr	--	--	--	--	--	--	--	--	--	--	--	--	--
. Physiological ER 7 yr	.14*	--	--	--	--	--	--	--	--	--	--	--	--
. Physiological ER 10 yr	.14	.20**	--	--	--	--	--	--	--	--	--	--	--
. Behavioral ER 5 yr	-.01	-.07	.01	--	--	--	--	--	--	--	--	--	--
. Behavioral ER 7 yr	-.00	-.04	.01	.63**	--	--	--	--	--	--	--	--	--
. Behavioral ER 10 yr	-.03	-.05	--.08	.50**	.54**	--	--	--	--	--	--	--	--
. Aggression 7 yr	.02	.07	.04	-.26**	-.20**	-.35**	--	--	--	--	--	--	--
. Social Competence 7 yr	-.09	.01	-.02	.47**	.53**	.45**	-.35**	--	--	--	--	--	--
. Shares	.00	.07	.04	.02	.09	.20**	.03	.11	--	--	--	--	--
0. Leaders	.05	.06	.03	.10	.22**	.24**	-.06	.15*	.55**	--	--	--	--
1. Smart	.01	.10	.02	.07	.20**	.26**	-.01	.16*	.76**	.65**	--	--	--
2. Fights	-.01	-.04	-.02	.02	-.04	-.12	-.01	-.03	-.63**	-.30**	-.47**	--	--
3. Acts Wild	-.01	-.02	-.02	-.05	-.03	-.18*	-.00	-.08	-.66**	-.35**	-.55**	.79**	--
4. Bossy	-.03	-.12	-.05	-.04	-.11	-.09	-.10	-.03	-.39**	-.15*	-.27**	.69**	.54**

* $p < .05$. ** $p < .01$.

Figure 2. Latent Friend Behavior One Factor Model, Based on Sociometric Nominations of Children's Mutual Friends in the Second Grade. The "r_" Notation Indicates a Reverse Scored Variable.

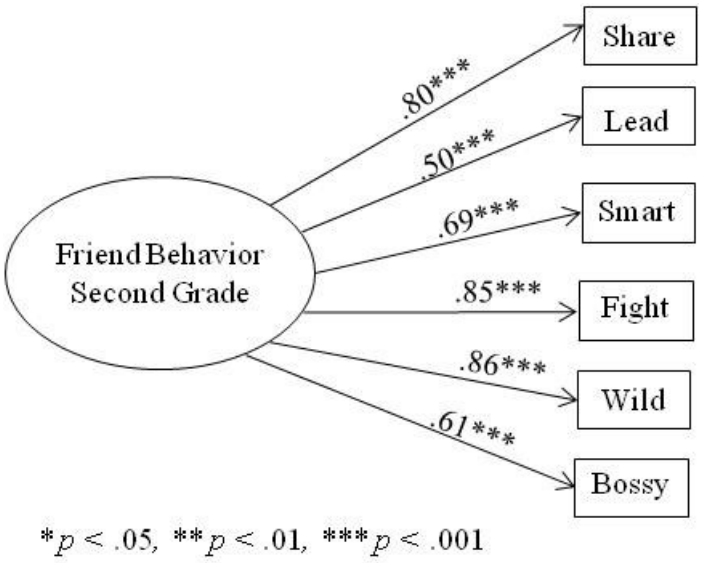
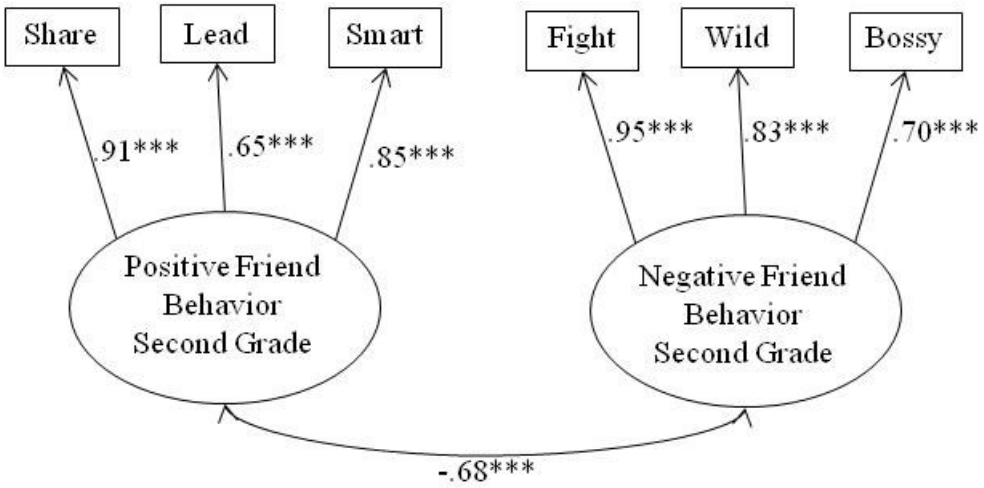


Figure 3. Latent Second Grade Friend Behavior Two Factor Model. The Two Factors Differentiate Positive and Negative Sociometric Nominations.



*$p < .05$, **$p < .01$, ***$p < .001$

Figure 4. Stability of the Physiological Indicator of Emotion Regulation (Vagal Withdrawal) From 5 to 10 Years.

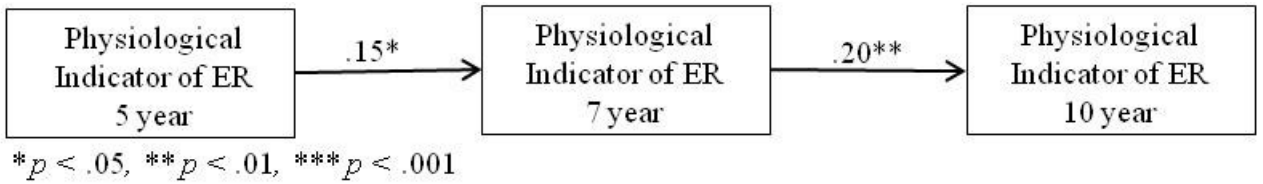


Figure 5. Stability Model of the Behavioral Indicator of Emotion Regulation (Maternal Report on the ERC) From 5 to 10 Years.

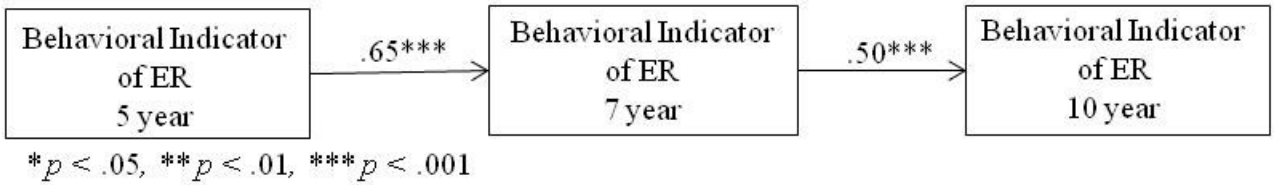


Figure 6. Full Physiological Structural Model Examining the Influence of Friend Behavior on Vagal Withdrawal. The Friend Behavior Variable Includes Both Positive and Negative Friend Characteristics Loading on the Same Latent Factor.

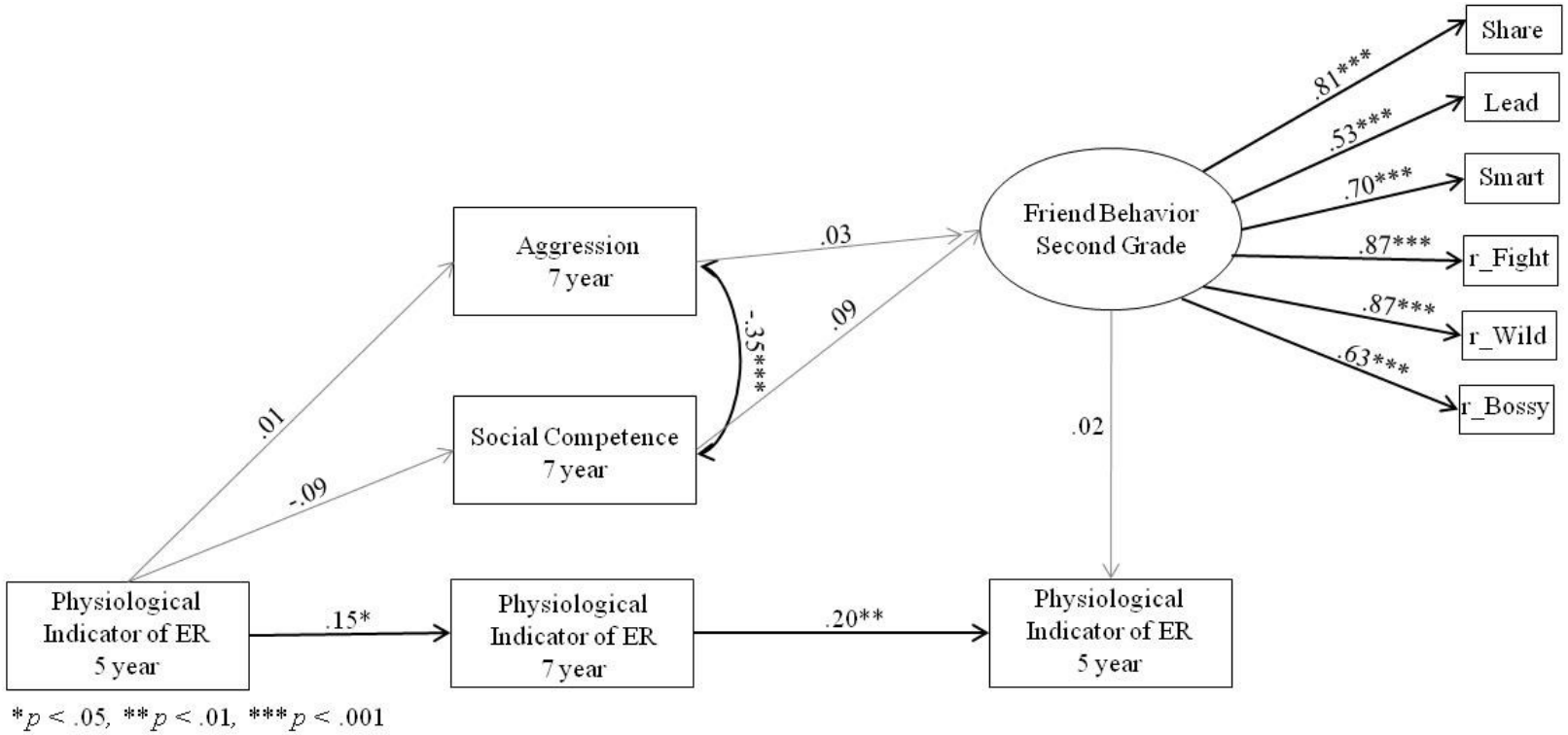


Figure 7. Full Physiological Structural Model Examining the Influence of Friend Behavior on Vagal Withdrawal Through Two Latent Constructs of Friend Behavior- Positive and Negative Friend Characteristics.

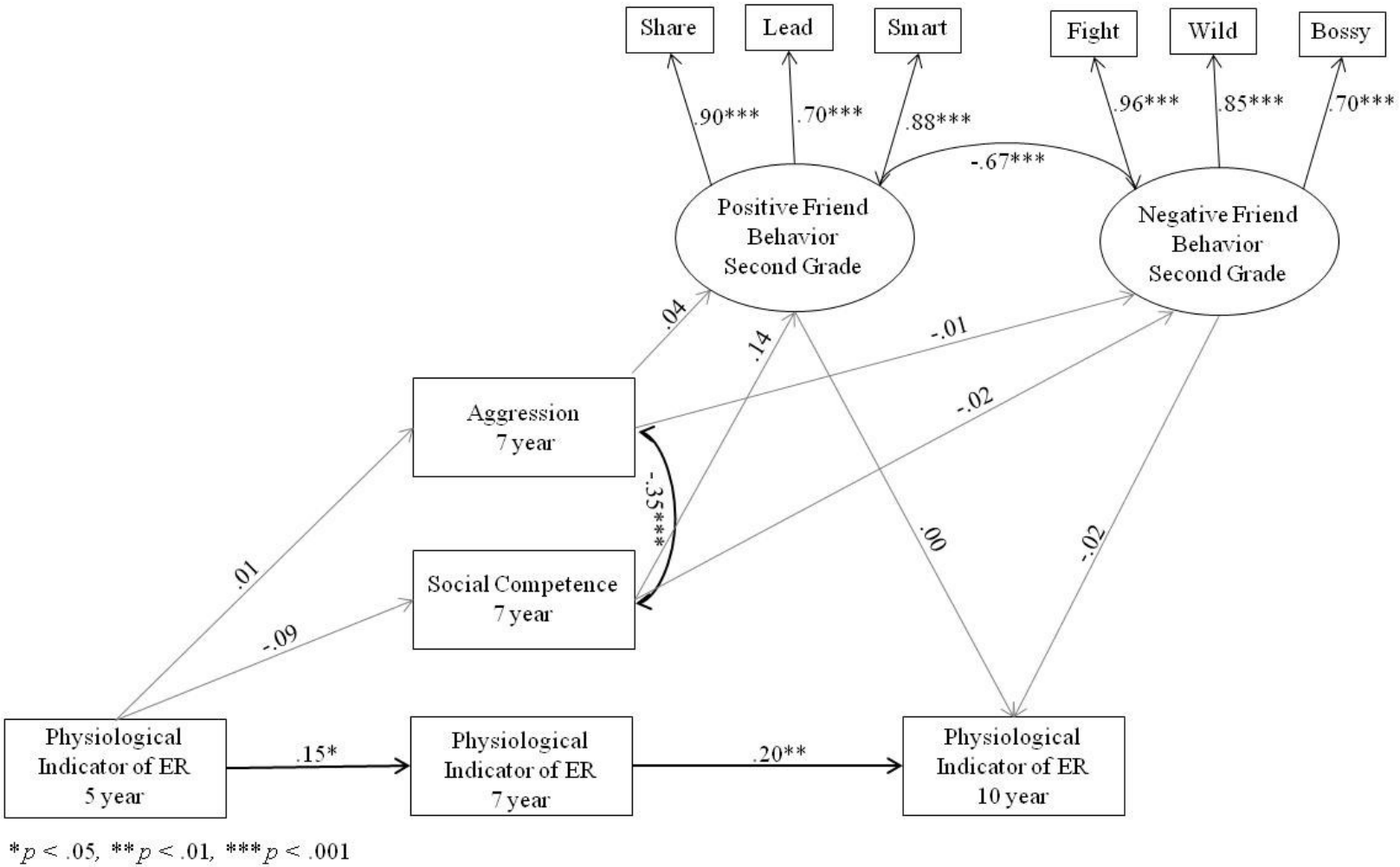


Figure 8. Full Behavioral Structural Model Examining the Influence of Friend Behavior on Maternal Report of Regulation. The Latent Factor of Friend Behavior Includes Both Positive and Negative Characteristics of Friends.

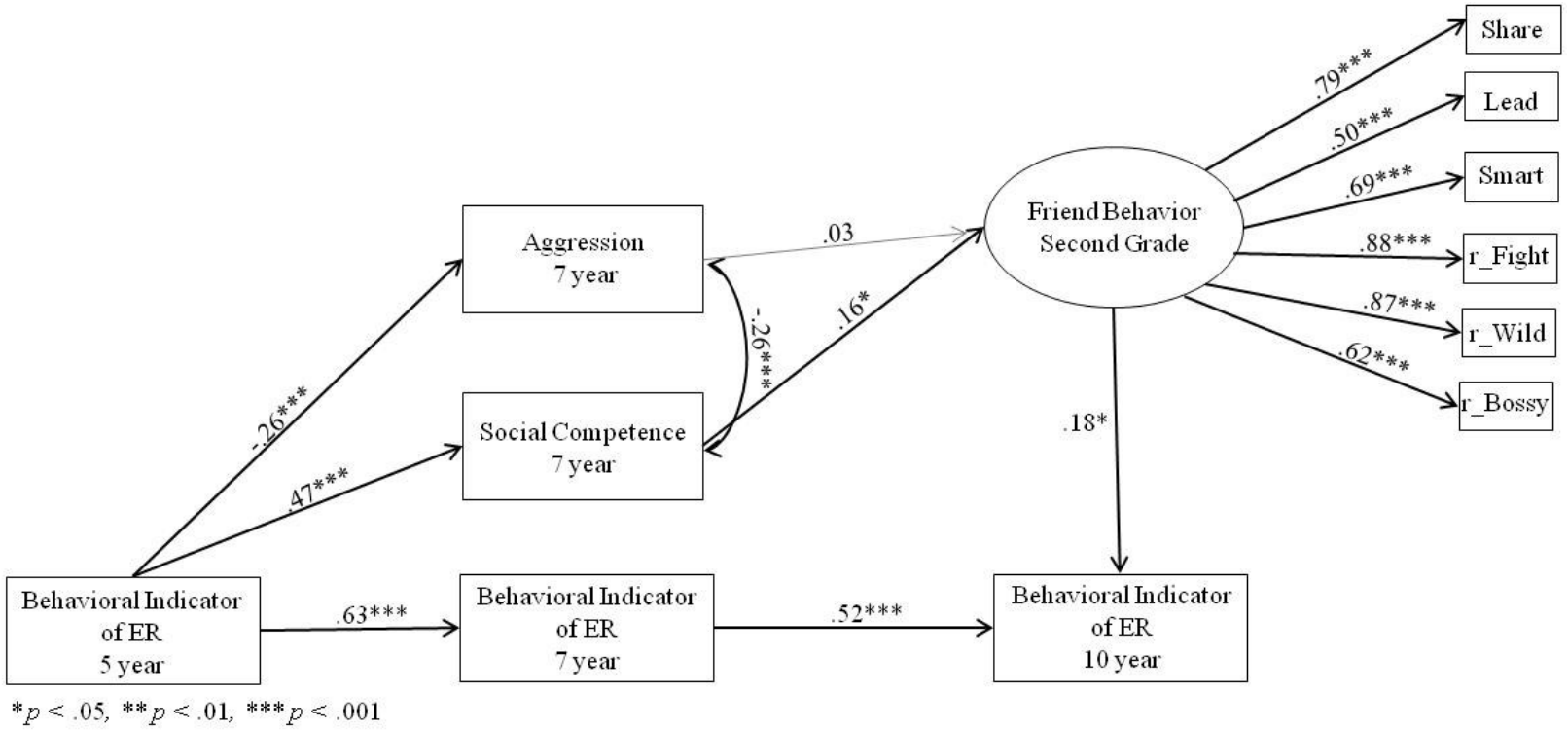


Figure 9. Full Structural Model Examining the Influence of Friend Behavior on Behavioral Index of Regulation with Two Latent Factors of Friend Behavior Indicating Positive and Negative Friend Characteristics Separately.

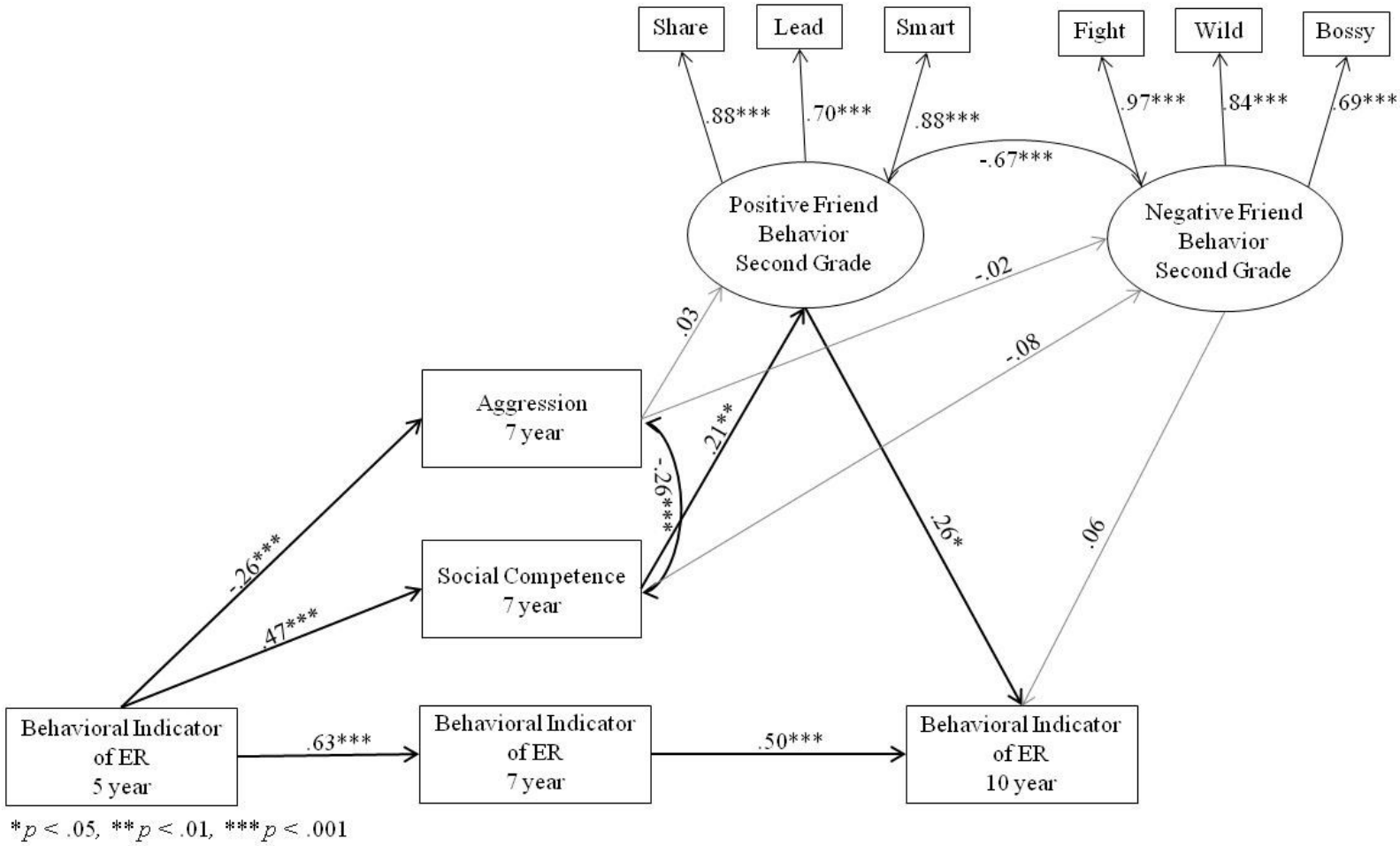


Figure 10. Full Structural Model of the Behavioral Indicator of Emotion Regulation for Boys.

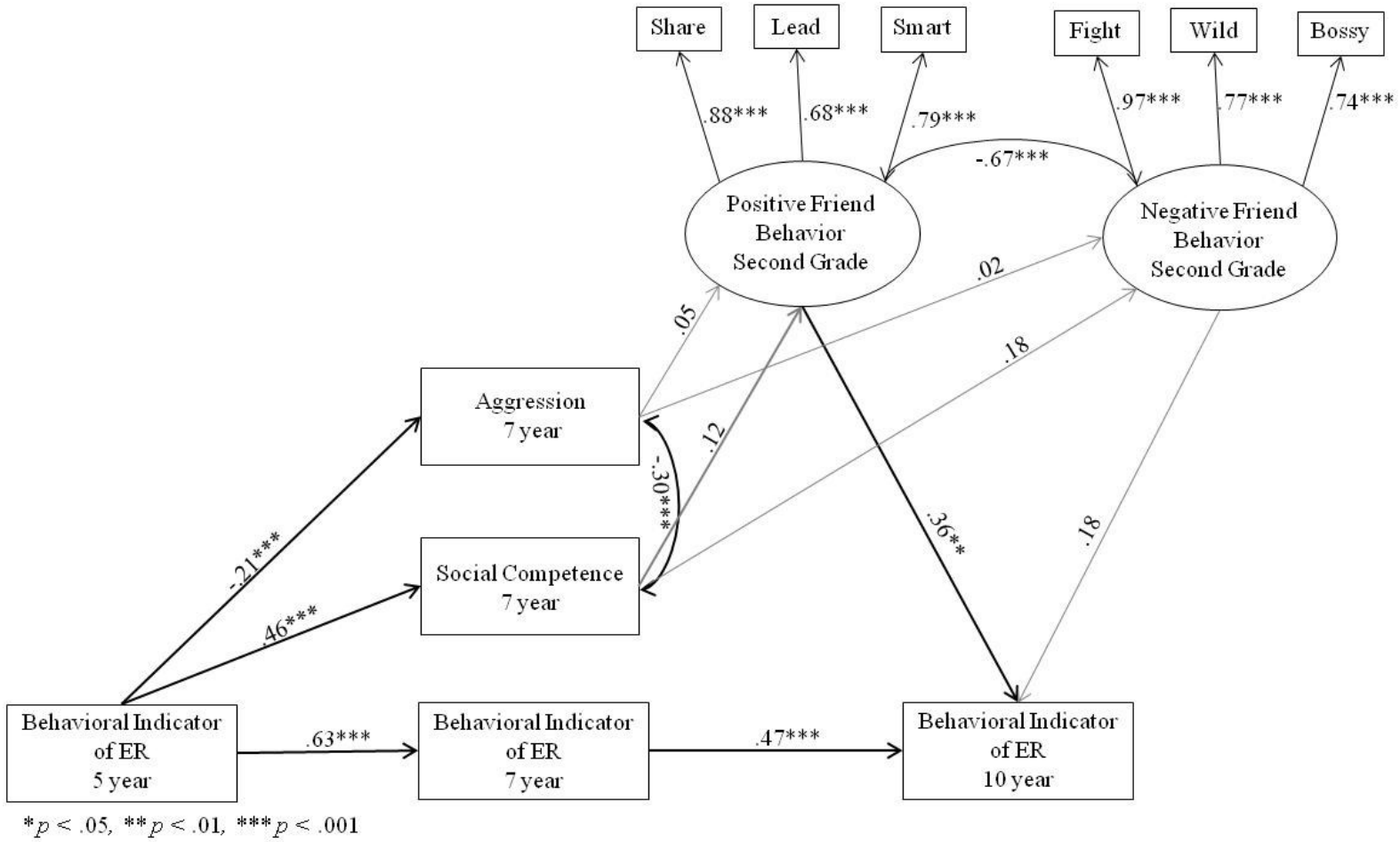


Figure 11. Full Structural Model of the Behavioral Indicator of Emotion Regulation for Girls.